1978

BRISTOL BAY

MANAGEMENT

REPORT

ADF&G

(FOR INTER-DEPARTMENTAL USE ONLY)

ALASKA DEPARTMENT OF FISH AND GAME

DIVISION OF COMMERCIAL FISHERIES

ANNUAL MANAGEMENT REPORT

-1978-

BRISTOL BAY AREA

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PREFACE

The 1978 Bristol Bay Management Report is the nineteenth consecutive annual volume reporting on and detailing management activities of the Division of Commercial Fisheries staff in Bristol Bay. This review emphasizes a descriptive account of the administration of the Bristol Bay commercial fishery resources, as well as outlining management objectives and procedures. Our basic objective in producing this document is to assist in creating a better understanding of the commercial fisheries management program in Bristol Bay.

Extensive reorganization of the documentation in this review, which was begun in 1975, represents our continued efforts to update and evaluate all information deemed necessary to fully explain the rationale behind management decisions formulated in 1978. The extensive set of tables represents our efforts to update information and to record material previously unlisted that may be useful and informative. All 1978 catch data are preliminary pending receipt of final computer listings of fish ticket catches. This report is considered to be "FOR INTER-DEPARTMENTAL USE ONLY."

Corrections or comments on the contents of this report should be directed to the area office at Dillingham, Attention: Editor.

Michael L. Nelson, Editor
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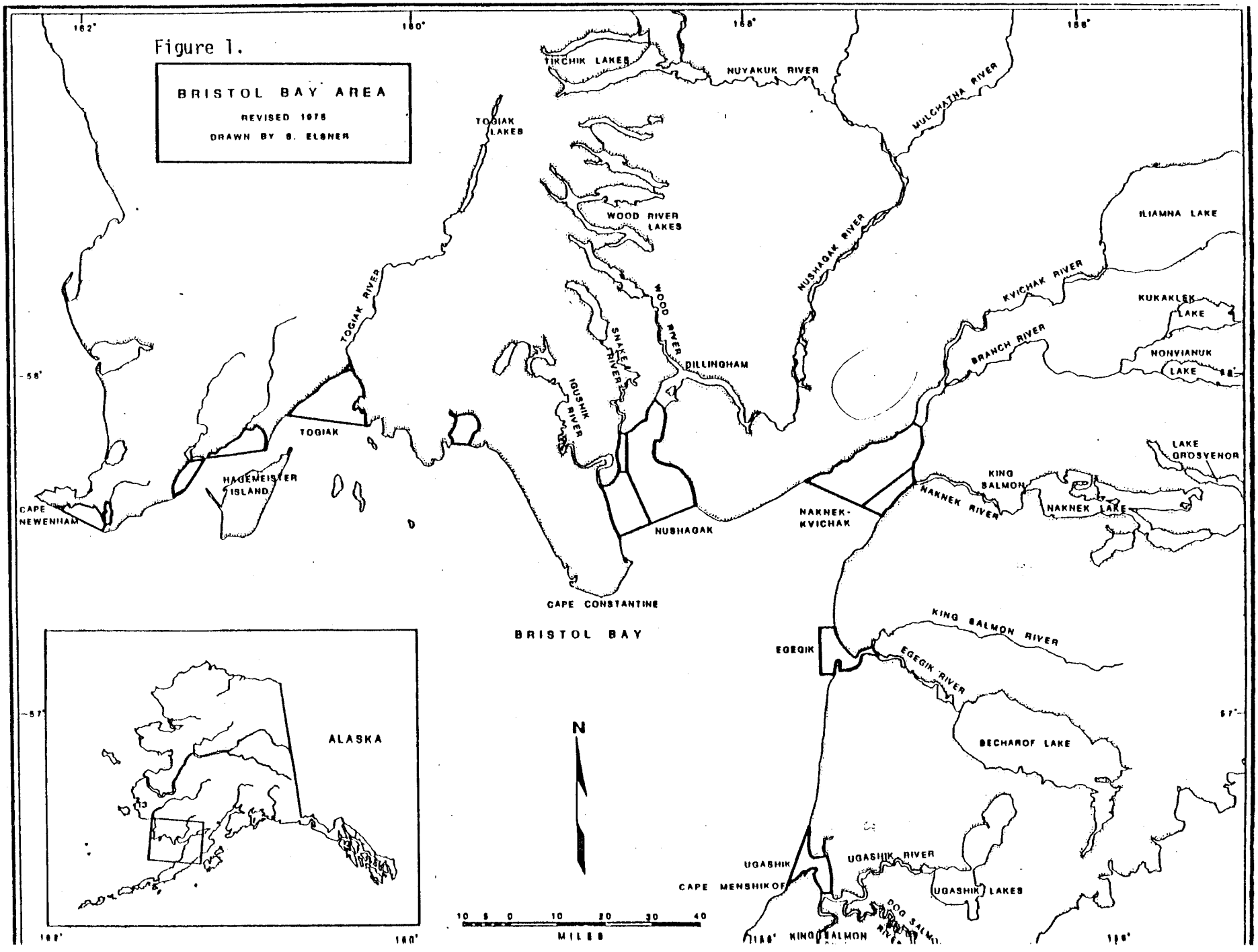
Figure 1.


BRISTOL BAY AREA
REVISED 1976
DRAWN BY S. ELSNER
162°
160°
158°
156°
TIKCHIK LAKES
NUYAKUK RIVER
MULCHATNA RIVER
TOGIAK LAKES
WOOD RIVER LAKES
NUSHAGAK RIVER
ILIAMNA LAKE
KVICHAK RIVER
KUKAKLEK LAKE
BRANCH RIVER
NONVIANUK LAKE
58°
TOGIAK RIVER
SNAKE RIVER
WOOD RIVER
IGUSHIK RIVER
DILLINGHAM
TOGIAK
HAGEMEISTER ISLAND
CAPE NEWENHAM
NUSHAGAK
NAKNEK-KVICHAK
LAKE GROSVENOR
KING SALMON
NAKNEK RIVER
NAKNEK LAKE
CAPE CONSTANTINE
BRISTOL BAY
KING SALMON RIVER
EGEGIK
EGEGIK RIVER
57°
BECHAROF LAKE
ALASKA
N
UGASHIK
UGASHIK RIVER
CAPE MENSHIKOF
UGASHIK LAKES
DOG SALMON RIVER
10 5 0 10 20 30 40
MILES
168°
KING SALMON
166°

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(continued)

TABLES (1978) (continued)

ANNUAL MANAGEMENT REPORT

BRISTOL BAY AREA

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INTRODUCTION

The Bristol Bay area includes all coastal waters and inland drainages east of a line from Cape Newenham to Cape Menshikof (Figure 1). Important commercial fisheries include harvests of salmon, herring and herring roe-on-kelp.

The area wide salmon catch during the 1978 season amounted to 16.5 million fish, the largest since 1970, while the harvest of 9.9 million sockeye salmon from the five major fishing districts dominated the catch. The inshore run of sockeye to Bristol Bay totaled 19.9 million fish, 8.4 million above the preseason forecast (Table 1). The sockeye harvest, alone worth more than $40 million to the fishermen, was more than double the recent nonpeak year average harvest. The entire salmon harvest in 1978 was valued at $52 million to participating fishermen, while the herring fishery contributed an additional $3 million (Table 33). Sockeye escapement goals were achieved for the fifth consecutive year in all systems except the Ugashik River (Table 1).

The exceptional sockeye returns in 1978 are a direct result of good escapements achieved through strict harvest control during recent years and improved survival conditions during the last few years. Drastic reductions in foreign high seas gill net fishing have reduced the interceptions of Bristol Bay stocks and also contributed to increased inshore returns.

Management considerations in this season's salmon fishery emphasized the achievement of sockeye salmon escapement goals in all systems while allowing the harvest of those fish excess to escapement requirements (Appendix A). In the Nushagak district where large runs of king, chum and pink salmon occur management strategies also allow for adjustments in the fishery whenever possible to achieve adequate escapements of these other species. Run strength was sufficient to obtain

sockeye escapement requirements in all systems with the exception of the Ugashik River which remained closed to fishing for the entire season.

Above average harvests were also realized for the other species of salmon and were highlighted by a record catch and total run of pink salmon (Table 5). The harvest of pink salmon was 5.2 million fish compared to 10 year average of 1.1 million.

Continued expansion in the catch and processing effort resulted in a record catch in the Togiak district herring sac roe fishery. The harvest of over 7,000 metric tons of herring was almost triple the previous record catch in 1977 (Table 36). Estimates of relative herring abundance based on aerial surveillance indicated a strong run of herring this year with widespread spawning observed on important beaches throughout the district. A record harvest of 330,000 pounds of herring roe-on-kelp also occurred during the 1978 fishery (Table 37).

Price Negotiations

Salmon price negotiations between the industry and the two active fishermen associations in Bristol Bay were concluded early in the season and little fishing time was lost. Western Alaska Cooperative Marketing Association (WACMA) settled prices in late May, while the Alaska Independent Fishermen's Marketing Association (AIFMA) finally settled in late June. Fishermen in both the Naknek-Kvichak and Egegik districts lost some fishing time prior to June 27 due to unresolved fish prices; however, other major districts were not affected. Final fish prices in 1978 showed a significant increase over prices in 1977, especially for sockeye salmon which rose to 68¢ per pound compared with 59½¢ paid in 1977.

Japanese High Seas Fishery

The Japanese high seas mothership fishery harvest of Bristol Bay sockeye salmon was again reduced in 1978 by implementation of the new INPFC treaty, which restricts, by area and time, the movements and fishing pattern of the

mothership fleet. Indications are that the new treaty arrangements drastically reduced Japanese interceptions of western Alaska salmon in 1978. However, questions on the impact of high seas land-based fishery harvests on North American salmon still need to be answered by further research.

Total Japanese high seas harvests by the mothership fleet from the 1978 Bristol Bay sockeye run included 328,000 fish taken as immatures in 1977, and 124,000 fish harvested as matures in 1978, or 452,000 fish and 2% of the total Bay run. This level of interception is well below the 20 year average of 10% and 1.9 million fish. In addition, the relatively low sockeye catches by the Japanese land-based gillnet fleet was also due, in part, to a series of reductions in this fishery brought about by the new INPFC treaty.

South Unimak/Shumagin Fishery

The inseason development of the Unimak/Shumagin June cape intercept fishery is closely monitored by Bristol Bay fishery managers because this fishery can be helpful in showing migration timing, relative abundance, age composition and fish size of the incoming Bristol Bay run. These intercept fisheries were again managed under a guideline harvest policy originally adopted in 1973 by the Alaska Board of Fisheries to prevent over harvest of sockeye runs to individual river systems in Bristol Bay.

The sockeye salmon catch at South Unimak in 1978 totaled only 9,000 below the guideline harvest level of 428,000. The fleet in this fishery consisted of 60-90 gillnet and 2-8 seine vessels, slightly less than in 1976 and 1977. The Shumagin Island June sockeye catch of 68,000 fell 26,000 below the guideline harvest level, reflecting both a price dispute through June 11 and a lack of run strength during the normal peak week. The Shumagin Island June fleet consisted of a normal 8-16 seine vessels and 2-4 setnet vessels.

Sockeye daily catches at South Unimak were steady with no discernable peak and did not reflect the eventual large run that returned to Bristol Bay. Chum

salmon catches were relatively weak, indicating a poor run was in progress. A larger than average catch of small pink salmon (2.5 to 2.9 lb. average) were taken in both the Shumagin and South Unimak fisheries in 1978.

Port Moller Test Fishery

The Department's Port Moller test boat fishery provides information on sockeye and chum salmon run timing and magnitude and age and size composition of the incoming run one week in advance of the inshore fishery.

Abnormally severe marine weather in the test fish area was experienced in 1978. Due to this inclement weather and a Coast Guard safety inspection of the test fish vessel, 6 of 8 days during the peak of fish passage at Port Moller were not sampled. Despite interpolation for missed data, the test fish project was unsuccessful in forecasting inshore run magnitude and timing. The 1978 run model predicted 7.9 million sockeye and 1.2 million chum salmon would enter Bristol Bay (Tables 6 and 7). The sockeye estimate was considerably below the actual return of 19.9 million, while the chum salmon estimated total return of 1.9 million was more accurately forecast. The timing and entry pattern of the sockeye run was also poorly forecast by the model used in 1978.

1978 COMMERCIAL SALMON FISHERY

Fishing Effort

Commercial fishing effort was similar to recent high years, with 2,618 units of gear and 1,864 vessels registered to fish Bristol Bay, compared with 2,279 and 1,728 respectively, in 1977 (Table 11). Of the total licensed gear units, it is estimated that only 1,893 units, or 72% actually participated in the fishery.

District registration in 1978 was similar to previous years, with Naknek-Kvichak and Nushagak districts accounting for over 76% of the total (Table 11). Registration by residency continued to show an overall resident/non-resident ratio of 2 to 1, with the usual district ratios: Naknek-Kvichak and Egegik districts with nearly equal numbers of resident and non-resident fishermen, while the remaining district fishermen were primarily residents (Table 11).

Industry Harvest Potential

In contrast to 1977, when only 74% of the available canning lines were operational, the strong sockeye forecast in 1978 prompted the salmon canning industry to make operational 97% of the Bay's available canning lines (Table 30).

A preseason assessment of statewide processing capacity and capabilities was prepared in 1978 for all major harvest areas of the State. The anticipated total Bristol Bay preseason harvest projection of 9.8 million fish (6.3 million sockeye, 0.1 million kings, 0.7 million chums, 2.6 million pinks and 0.1 million cohos), was well below the total estimated seasonal processing capacity of 19.0 million fish (Appendix B). The abnormal bimodal entry pattern of sockeye, particularly in the Naknek-Kvichak district, and the stronger returns than forecast of sockeye and pinks to Nushagak district, severely impacted the processing industry and caused untold processing difficulty all season long. Most companies were forced to suspend buying operations for varying periods to hold the daily

catches within individual daily company processing capacities. The Bristol Bay processing capacity report for 1978 is attached as Appendix B.

Salmon Market Production

Thirteen companies operating 38 of 39 available canning lines (Table 30) totaled a salmon case pack in 1978 of 802,000 cases (48-1 lb. talls) compared with the long term average case pack for all species of 578,000 (Table 31).

In 1978, about 1.6 million salmon were transported out of Bristol Bay by nine companies for processing in other areas (Table 32). These salmon exports would be equal to over 129,000 cases of salmon provided all were canned.

Production levels of fresh, frozen and cured salmon continued to increase in 1978 as market conditions improved in this area. Over 11.4 million pounds of salmon, the highest since adequate records were first maintained in 1960, were produced in 1978 as demands for frozen and cured products continued to increase (Table 31). Fresh export (those fish exported from the Bay by air transportation) continued to increase in 1978 with 10.0 million pounds flown out directly to fresh markets or for further processing (Table 32).

Sockeye Salmon

The total sockeye salmon return in 1978 of 19.9 million was over triple the average historical level of 5.8 million for comparable years in the current five year cycle. The majority of the run consisted of fish produced from three brood years (1972-1974). Two of these brood years (1972-1973) were the lowest since accurate records first became available during the late 1950's.

Above average production from low escapements in 1973, however, resulted in exceptional numbers of five year old fish this year, particularly in the Nushagak district (Table 3). Strong escapements in 1974 also produced large returns of four year old fish, especially to the Kvichak and Wood Rivers (Table 3). A large return to the Kvichak River was anticipated and is the result of a recently

adopted escapement management plan for this system. This plan requires increased escapements in the Kvichak River during the year immediately preceding the peak with the objective of spreading sockeye salmon production over several years in the system's five year cycle. Four year old fish also dominated the run in the Wood River system and were produced from a 1.7 million escapement in 1974.

A general overview of the sockeye fishery is difficult since the run entry pattern and management requirements vary from district to district. Some of the more important problem areas and management complexities that characterized the fishery in 1978 can be summarized as follows:

1. The total run exceeded forecasted expectations by 8 million fish with near record returns in some systems.
2. The Kvichak section was opened to continuous fishing on July 6 while lagging strength in the adjacent Naknek River required simultaneous closures of the Naknek section in order to secure the necessary escapement.
3. Smaller than forecasted returns to the Ugashik River necessitated an extended closure of the district to enhance needed escapements.
4. An atypical bimodal entry pattern occurred in most major rivers and complicated the interpretation of run strength when compared with historical trends.
5. Rapid migration of fish through the fishery exaggerated the normally short duration and intensity of the fishery. In some instances the fish spent only half the time they normally do passing through the fishery and ascending the rivers.
6. Adverse weather hampered efforts to assess the run size and entry pattern and ultimately reduced the catch capacity of the fleet during peak fishing periods.

7. Processing capacity was exceeded for varying periods near the peak of the run.

The 1978 sockeye run was also an exceptional one in many other respects. The total run to the Naknek-Kvichak district of 10.2 million was about four times the average for all past years in the same relative position of the five year Kvichak River production cycle. The Kvichak River escapement of 4.1 million was the largest in this stage of the cycle since accurate counts were first available in the mid-1950's and the catch (5.0 million) was the largest since 1936 for all comparable years.

The 1978 season in the Nushagak district was comparable to many of the years during the early 1900's to 1930's when peak production occurred in this district. The total sockeye run of 6.7 million was the largest since both catch and escapement estimates were first available in the late 1940's. The escapement into Wood River of 2.3 million was the third largest ever recorded and was only exceeded in 1908 (2.6 million) and in 1946 when 3.7 million fish escaped the fishery. Although the 2.3 million Wood River escapement in 1978 was well above the management goal, concerns over the probable production from this brood year should be partially tempered by the fact that this year's return was produced from a 1.7 million escapement in 1974. The difficulty of clearly defining optimum escapement levels for any system in Bristol Bay is further illustrated by the 1.4 million fish produced by the Nuyakuk River system this season from the 1973 escapement (Table 4). The 110,000 Nuyakuk escapement in 1973 was less than half the escapement goal and equates to a 10 to 1 return per spawner.

Catch and escapement of sockeye to the Togiak district was also the largest in the history of the fishery (793,000) and exceeded the previous record set in 1976 by over a quarter of a million fish.

King Salmon

The king salmon run to Bristol Bay in 1978 was exceptionally strong. The commercial harvest of 175,000 was the second largest in the 86 year history of the fishery and was well above the long-term average catch of 94,000. The Nushagak district normally produces over 75% of the area king harvest and the 1978 run of 236,000 was the strongest year here since total run estimates were first available in 1966. The king catch of 106,000 in this district was the largest in 15 years and the escapement of 130,000 is the largest ever recorded.

The Togiak district also produced a record run of king salmon and was almost double the previous record of 55,000 set only a year ago. The total run of kings to this district amounted to 96,000, with a catch of 56,000 and escapement of 40,000.

Chum Salmon

The area chum salmon harvest of 1.2 million fish was double the long-term average and the fifth largest catch ever made. The Nushagak district accounted for over 50% or 664,000 of the total harvest (Table 19). The chum harvest in the Togiak district of 277,000 was the largest ever made and just slightly above the previous record of 271,000 set during 1977.

This year's chum run was also unusual since five year old fish from the 1973 brood year were dominant while a majority normally return as four year old fish.

Escapement estimates for chum salmon are made only in the Nushagak and Togiak districts where over 70% of the Bristol Bay harvest of this species occurs. Just under 300,000 chums escaped the fishery in the Nushagak, while the 396,000 chum escapement in the Togiak district was the second largest ever recorded.

Pink Salmon

The pink salmon return in 1978 was nothing short of phenomenal. Bristol Bay produces significant runs of this species only during even years and the total run this season was nearly 16.7 million fish (Table 5). The commercial harvest of 5.2 million for all districts was almost five times the long-term average of 1.1 million. The total run of 13.7 million in the Nushagak district was the largest in the history of recorded catch and escapement and is very likely the largest ever. The next largest run in Nushagak was 5.1 million in 1958. The Naknek-Kvichak district pink run was also large. The catch in this district of 735,000 was the second largest in the history of the fishery and was surpassed only by a 950,000 fish catch in 1920. The total pink run to the Naknek-Kvichak district amounted to 2.7 million (Table 5).

Coho Salmon

The coho harvest of 82,000 for all districts combined was almost double the long-term average of 45,000. The Nushagak and Togiak districts accounted for almost the entire area wide harvest (79,000). Much of the catch in the Nushagak district occurred incidental to the pink fishery, however, increased late season fishing effort here and at Togiak has resulted in increased coho salmon catches during recent years.

DISTRICT MANAGEMENT SUMMARIES

Naknek-Kvichak District

The combined runs to this districts' three major river systems were expected to produce slightly over 4.0 million sockeye salmon surplus to escapement requirements (Table 1). Although it was anticipated that Kvichak River stocks would dominate the run, the Naknek River contribution was expected to comprise about 22% of the district total.

Commercial harvests of all five species of salmon from this district have averaged about 2.9 million fish for non-peak years during the last two decades. Catches of salmon other than sockeye normally comprise a minor portion of the total (5%), although pink salmon harvests during the last three cycle years for this species have been above average. Sockeye runs to this district exhibit wide fluctuations due to the cyclic production pattern of the Kvichak River stocks. The 1978 run was a non-peak production year in the five year cycle.

A preseason canvass of available fishing effort for the eight major processors in this district indicated in excess of 600 units of drift gear would participate in this year's fishery. Over 75 of these fishermen indicated their intentions to fish during king salmon and/or early sockeye openings in the Nushagak and Egegik districts through the last week of June. Actual peak effort of 770 units of drift gear and 182 units of set gear was observed during the opening on July 6 (Table 13). Unresolved price disputes between fishermen and major processors ultimately delayed participation by a majority of the fishermen until June 27 and resulted in only minimal effort during an earlier 12 hour opening on June 25-26 (Table 13). The only effort on hand for this initial opening consisted of independent fishermen associated with other minor processors and cash buyers.

Most of the harvest in this district is processed at local shore based canneries. Available processing capacity within the district was up markedly from the previous season (Table 30). Red Salmon Company cannery at Naknek was rebuilt following the disastrous fire there in 1973 and was ready for full production this season, while the Alaska Packers Association plant at South Naknek was ready for canning after being idle last season. A major shore based freezing operation was made ready at the New England Fish Co. Pederson Point plant. Several large freezer ships were also on hand and provided additional new processing capability within the district. An increasing number of fish were also airlifted out of the area this season for processing elsewhere (Table 32). The remainder of the harvest was transported out of the district and canned at plants in Egegik and in the Nushagak district or hauled aboard brine tenders to canneries outside of Bristol Bay (Table 32).

Fishing effort during the four full days of fishing immediately prior to the start of the regulatory period on June 23 managed a catch of 67,000 sockeye salmon (Table 13). By this date no obvious trend in the development of the run was apparent, however, several indicators were somewhat ahead of schedule. Catches with only minimal effort during the week before the regulatory closure on June 23 were above normal for this date. Strengthening catches near the end of the week also coincided with a sharp increase in catches by the Kvichak River inside test fish boat and suggested escapements were also progressing ahead of normal for this date (Table 23).

Test fishing offshore from Port Moller got underway on June 11, but indices here fluctuated and generally remained at a low level until June 20 when catches suddenly increased (Table 6). Unfortunately the weather conditions at Port Moller prevented fishing for the next three days, and when fishing resumed on June 24, the largest catch and uninterpolated daily index of the season was reported by this program (Table 6).

In light of the generally favorable catch and escapement trends that existed at that time a 12 hour period was announced for the entire district for June 25-26 (Table 12). Most fishermen did not fish due to the price dispute and a insignificant amount of effort managed a catch of less than 3,000 fish, which was not indicative of run development into the district by that time (Table 13). Escapements continued ahead of normal in the Kvichak River through June 26, and although inclement weather prevented an aerial escapement survey that day, the inside test boat at Nakeen indicated sockeye escapements were continuing to build in the lower portion of the river (Table 23). With only moderate catches to date and an apparent building trend into the lower river, a second 12 hour opening was permitted on June 27-28. Price agreements had been negotiated by this time and the entire fleet fished for the first time. CPUE was high and the combined harvest of all species amounted to over 758,000 fish (Table 13). Indices from the inside test boat on the Kvichak River at Nakeen revealed increasing escapements above the commercial district despite the large catches made by the fleet (Table 23). At the closure of the period on June 28 the Kvichak River escapement estimate was in excess of 600,000 fish, however poor aerial survey conditions prevented visual confirmation of escapements in the upper river. The sockeye escapements past the counting station on the Naknek River experienced a sharp increase on June 28 establishing a somewhat earlier than normal trend here also (Table 20).

Indications of fish offshore from Port Moller continued strong through June 26, however the crew there was unable to fish for an additional two days on June 27-28. All told, the offshore test boat missed almost six full days of sampling during the period June 20-28 when the peak of the incoming sockeye run passed through this critical indexing area (Table 6).

By the afternoon of June 28 there was no change in the status of the run. Sockeye escapements were running ahead of normal for this date and catches during the previous period were stronger than expected and amounted to over 20% of the total forecasted harvest for the district. Following a 38 hour closure the district was reopened for an additional 12 hour period on the evening of June 29 (Table 12). Effort remained about the same, however the total catch and CPUE was only two thirds of the previous period (Table 13). Fish were abundant at the opening, but on the first of the flood near the closure fishermen reported only scattered concentrations of fish. A decline in the Kvichak River escapement rate was also evident from a sudden drop in test fish indices on June 30 (Table 23). Improving weather permitted an aerial escapement estimate on the Kvichak River and the combined aerial and tower counts suggested an assured escapement of 1.1 million (Table 23). Escapements were still ahead of schedule for this date, however mild spring conditions and warmer water temperatures suggested the possibility of earlier than normal run timing. Almost 33% of the forecasted season harvest of sockeye had been secured by the end of the period on June 30.

The overall situation prompted the adoption of a cautious attitude toward any immediate announcements for additional fishing time pending an improvement in the status of the run. Inside test fishing, aerial surveys and upriver escapement counts during the ensuing three days failed to detect any significant change in the status of the run (Table 23). In the absence of the fleet, outside test fishing boats were also dispatched on July 1 to conduct a thorough coverage of the fishing district to monitor the distribution and relative abundance of fish on the fishing grounds. Not until July 3 was there a significant buildup of fish located anywhere within the district (Table 8). Concentrations of fish were restricted to the ships anchorage area and the main channel extending along the

east side of the Kvichak section from Pederson Point to Graveyard (Table 8). This pattern was evident again from district test fishing on the following day (July 4). Inside test fishing on the Kvichak River on July 4 could detect no significant buildup of fish above the district, and an aerial escapement estimate of the Kvichak River that same day, revealed no improvement in the escapement rate (Table 23). As early as July 2 general announcements were broadcast to the fishermen and industry keeping them informed of the status of the run and outlining the dim prospects for any additional fishing time in the immediate future (Table 12).

The first indication of a possible reversal in the sockeye escapement trend came on July 4 when the Naknek River escapement counts began increasing again (Table 20). This was followed by a sharp climb in the test fishing catches at the mouth of the Kvichak River on July 5, and was subsequently verified by an aerial survey on the same day when an estimated 543,000 fish were observed in clear water upriver from the test fishing site (Table 23). It was apparent by this time that a 1.5 million sockeye escapement was assured in the Kvichak River. Escapements were also continuing to increase on the Naknek River, however by midnight of July 5, barely 42% of the goal was assured and was lagging behind the concurrent trend in the Kvichak River (Table 20).

After a six day closure of the district an announcement was made for a 12 hour opening in the Kvichak section only starting at 12 noon on July 6 (Table 12). Since the Naknek section remained closed, the normal 48 hour waiting period for relocation of set nets was waived for set net fishermen wishing to relocate to another site on the Kvichak side of the district (Table 12). An estimated 770 units of drift gear and 182 set nets fished the opening and catches were heavy throughout the period (Table 13). Inside test fishing catches and sockeye escapement counts continued to escalate and by midnight, July 6, the lower end of the

Kvichak River escapement management range was assured (Table 23). Fishing time was then extended in the Kvichak section until further notice and ultimately remained open until July 17 with the resumption of regular five day-per-week fishing (Table 12).

The peak daily sockeye escapement into the Naknek River of 161,000 occurred on July 6, and brought the accumulative escapement count to about 62% of the goal of 800,000 (Table 20). Based on the improving trend a 12 hour period was subsequently announced for the Naknek section beginning at noon on July 7 (Table 12).

Two additional extensions were permitted in the Naknek section during the next two days as the escapement began approaching the lower end of the management escapement range of 700-900,000 fish, but a progressive decline in the rate necessitated another closure of the section on the afternoon of July 9 (Table 20). These three consecutive openings amounted to 49 hours of continuous fishing in the Naknek section. Daily escapements remained low during the next two days, but again increased on July 12 and prompted another 24 hour period starting the afternoon of July 13 (Table 12). The trend was short lived, however, and the daily escapement dropped below 10,000 fish on July 14 and remained so throughout the duration of the run (Table 20). Regular five day-per-week fishing was allowed to resume after the end of the emergency order period on July 17. Because the tide conditions that prevailed during the regulatory opening at 9 A.M. on July 17 would have prevented many set netters from fishing the opening, the starting time was moved up two hours to accomodate these fishermen (Table 12).

The season harvest of nearly 5.0 million sockeye salmon was almost 1.0 million larger than the preseason forecast and is the largest catch since 1936 in the same relative position in the cycle. The total run to the Naknek-Kvichak district was 10.2 million and when compared with the previous four years at the same position in the Kvichak cycle (1958-63-68-73) is over four times the average of 2.5 million.

The Kvichak River escapement of 4.1 million is the largest in this stage of the cycle since complete escapement records were first available in the mid-1950's. The next largest escapement in this position of the cycle was 2.6 million in 1968.

The escapement of 813,000 in the Naknek River was very close to the desired goal of 800,000 (Table 1). The total run to the Naknek system exceeded the forecast by 300,000 fish, but management of these stocks was complicated by the interception of Naknek River fish during uninterrupted fishing on the more abundant Kvichak River stocks in the adjacent section. The simultaneous closures of the Naknek while the Kvichak remained open proved to be very unpopular but were required in order to optimize sockeye escapement in the Naknek system.

Management of the entire district was also made more difficult by the atypical dual or bimodal run this season in both the Naknek and Kvichak Rivers. The first peak occurred in the district on about June 28 followed by another distinct surge of fish about a week later on July 5-6. In spite of the unusual migration pattern which interrupted fishing time until escapement trends were confirmed on July 5, fishermen caught almost 5.0 million sockeye salmon. Rapid migration of fish through the fishery also exaggerated the normally short duration and intensity of the fishery. The fish spent only half the time they normally do passing through the fishery and ascending the rivers. Inclement weather during the second week of July also disrupted fishing and reduced the fleet's ability to capitalize on the short peak in the availability of fish. Processing capacity was also exceeded for short periods near the peak of the run.

Age composition of the sockeye run this season was dominated by four year old fish (64%) from the 1974 brood year escapement into the Kvichak River (Table 3). These exceptional returns are due to the combined results of larger than usual brood year escapements at this stage of the cycle and improved survival conditions

during the past few years. Beginning in 1969 the escapement goal for the brood year immediately preceding the peak year was increased from 2.0 to 6.0 million fish in an effort to spread out the production more evenly over the five year Kvichak cycle. Extremely severe climatic conditions during the early 1970's reduced the returns from the larger escapement in 1969. A similar escapement management strategy was applied in the next cycle and a 4.4 million escapement was secured in the Kvichak River in 1974. The exceptional returns of four year old fish in 1978 lends support to this change in escapement management philosophy for the Kvichak system, however, the full merits of the plan will be born out by ultimate returns in the next few years.

The combined harvests of the other species of salmon amounted to 922,000 fish and was highlighted by the second largest pink salmon catch in the history of the Naknek-Kvichak fishery (Table 19). The season catch of 752,000 pink salmon was surpassed only by a 950,000 fish harvest in 1920. Late season fishing effort and processing capacity was minimal and consequently the total catch was not indicative of the actual number of fish available for harvest. Because of the unusual size of the pink salmon return, aerial escapement counts were conducted on the major river tributaries this season and almost 2.0 million fish were observed on the spawning grounds (Table 22).

The total harvest of all salmon in the Naknek-Kvichak exclusive of sockeye salmon has averaged slightly over 266,000 during the past 20 years. This year's catch of 165,000 chum salmon surpassed the historical average while the king and coho catches fell short of long term trends for these species.

Egegik District

The forecasted sockeye run to the Egegik district in 1978 amounted to 1.5 million fish with an escapement goal of 600,000 and a anticipated harvest of 924,000 (Table 1). The 1978 run to Egegik River exhibited the same bimodal run timing as that experienced in the Naknek-Kvichak district, with peak days in the district coming on June 28 and July 6-7 (Table 14).

Fish migration timing during the 1978 season at Egegik was not normal. The first part of the run came in as expected with fish migrating through the district, river and lagoon at fairly normal rates. The second portion of the run differed greatly. The fish first held outside of the district for several days, and then moved through the district, river and lagoon in less than 48 hours. The large amount of fish in the district caused several canneries to suspend fishing entirely or put their fishermen on restrictive limits for short periods of time. Registered effort in the Egegik district was 239 drift units and 160 set units (Table 11). Actual peak fishing effort occurred during the period on June 30 when 266 drift units and 144 set units fished (Table 14). Fishing effort during the peak of the run on July 7-8 diminished due to transfers and consisted of 170 drift units and 124 set units (Table 14).

Egegik lagoon aerial surveys began on June 18 and through June 23 showed a steady buildup of fish (Table 24). The commercial harvest up to the beginning of the emergency order period on June 23 was 129,000, or 14% of the forecasted catch and was the largest catch during this time period since 1967 (Table 14). Inside test fish catches through this same time period showed a slow, but increasing, rate of escapement into the river (Table 24).

A 12 hour period was announced for June 24-25 and the sockeye catch of 28,000 was low as most fishermen were still involved in a price dispute (Table 14). The accumulative catch through June 25 was 157,000, or 17% of the forecasted harvest. The estimated escapement through June 25 was 13,000 past the counting tower at the lake outlet (Table 20), and about 8,000 fish in the lagoon (Table 24). Inside test fish estimates indicated an approximate escapement of 36,000 or 6% of the goal (Table 24). It was felt at this time that the sockeye run to the Egegik district was either early or strong or a combination of both. The outside test boat made four drifts on June 26 and caught fair numbers of fish in all areas of the district (Table 9).

Another 12 hour period was announced for June 27-28 after a closure of 38 hours, and the catch amounted to 142,000 sockeye bringing the accumulative catch to 299,000, and 32% of the forecasted harvest (Table 14). Escapement continued to climb as tower counts reached 34,000 through June 28 and a Egegik lagoon aerial survey estimate on that day showed another 50,000 were present below the counting towers (Table 24). The 84,000 estimated sockeye escapement into the lake and lagoon and with the inside test boat catch indices estimating a total of 128,000 past the test fish site, another 12 hour period on June 30 was announced after a closure of 52 hours. Meanwhile, a 12 hour period in the Naknek-Kvichak district on June 29-30 produced a catch that was 240,000 fish less than the previous period on June 27-28.

The Egegik opening on June 30 produced only 58,000 sockeye, and it appeared that the run may have already peaked. Sockeye escapement through June 30 was 93,000 past the counting tower, with another 210,000 estimated in the lagoon below the tower (Table 24). Inside test fish estimates of 215,000 total fish past the site were lower than the actual estimated escapement. The low period catch on June 30, and with only 51% of the escapement goal achieved, a decision was reached to close the fishery, a closure which eventually lasted 6½ days (Table 12).

The outside test fish boat was sent out each day of the closure from July 1 through July 6 (Table 9). Test catches on July 1 were practically zero, but improved on July 2 with fair numbers of fish found off Goose Point and near the ships channel buoy (Table 9). Inside test fish catches dropped drastically during June 30-July 1 and 2 (Table 24). Low inside test boat catches continued for the next three days with only minor increases each day (Table 24). The outside test boat made fair catches on July 3 but only near Red Bluff, however on July 4 catches began to improve and fair to good catch indices were indicated in the northern

half of the district, however the fish were not moving into the river and no fish were caught off Coffee Point (Table 24). Outside test boat catches increased sharply on July 5, with one drift at Coffee Point producing a catch index of 1,402 (Table 9). The inside test boat escapements also increased dramatically rising from a daily escapement of 22,000 on July 5 to 190,000 on July 6 (Table 24). Sockeye escapements on July 6 were 288,000 past the counting tower and about 10,000 in the lagoon, while the inside test fish program estimated a total escapement of about 446,000 (Table 24).

It appeared now that the Egegik sockeye run was also assuming a bimodal entry pattern and that the second run of fish contained the bulk of the total run. A 12 hour period was finally announced for 11 a.m. on July 7 after a 6½ day closure to secure adequate sockeye escapement. The 300,000 assured escapement through July 6, and approximately 190,000 sockeye in the river as indicated by the inside test fish program, and with another tide before the next opening, it was apparent that at least the lower escapement range was assured (Table 24). The commercial sockeye catch during the first 12 hours of the period on July 7 approached 250,000 fish. An aerial survey on July 7 during poor conditions produced a minimum estimate of 75,000 sockeye in the lagoon, while the escapement past the tower at the time of the survey was 346,000 (Table 24). Inside test fish catches remained high through July 7 (188,000), thereby assuring the escapement and prompting an extension of the fishing period for 25 hours (Table 12). The period was later further extended until the end of the emergency order period on July 17 when attainment of the escapement goal was verified (Table 12).

The total season catch of all species was 1.3 million (Table 19), 9% above the 20 year average, while the sockeye catch of 1.2 million was 6% above the average. The total sockeye escapement of 896,000 was 7% above the 20 year average, and the total sockeye run of 2.1 million was also 7% above the long term average.

The catch of other species in the Egegik district comprised only 6% of the total catch. The king salmon catch of 3,000 was 19% higher than the average; the chum catch of 58,000 was 130% above the average catch; the pink catch of 10,000 was 903% above the even-year average; and the coho catch of 1,000 was 37% of the long term average. No escapement estimates are available for these species.

Ugashik District

The forecasted sockeye run to the Ugashik district in 1978 was 247,000 fish (Table 1). The escapement goal for this river is 500,000 fish, and no harvest was anticipated. Preseason gear registration levels were 46 drift units and 35 set units (Table 11). Virtually all fishermen in this district transferred out of the Ugashik area once the early season king fishery was over. Actual peak fishing effort occurred during the July 19-20 period when 54 drift units and 4 set units fished (Table 15).

Prior to the emergency order period on June 23 only 2,000 sockeye had been harvested (Table 15). Aerial surveys of the Ugashik lagoon began on June 24 and did not show any significant buildup of fish until July 13 when 5,000 were counted (Table 25). By July 15 the lagoon count was up to only 26,000 with 40,000 past the tower (Table 25). Inside test fish indices had been dropping since the peak on July 9, and it was clear at this point that the Ugashik sockeye run would most likely fall well below that forecast, and that additional closure would be necessary to protect the remaining run (Table 25). An extended closure of 48 hours was announced with a 24 hour period of open fishing to begin on July 19 to assess remaining sockeye run strength in the district. A disappointing catch of 6,000 sockeye was made during this 24 hour period, and the district was subsequently closed to further fishing until July 24 to protect the remaining fish (Tables 12 and 15).

The total sockeye run to this system was only 81,000 fish, 33% of the forecast and 18% of the long term average. The total catch of all species of 19,000 was only 6% of the 20 year average. The only species other than sockeye which contributes any significant catch are king and coho salmon. The king catch of 6,000 was three times the average, while the coho catch of 1,000 was only 31% of the long term average.

The inside test fish program, reinstated in 1978, did not appear to give reasonable numbers of fish passing into the river, but it did provide accurate accounts of timing and general run strength which were of considerable help in determining run magnitude.

Nushagak District

In Nushagak district the preseason inshore sockeye salmon forecast to all river systems totaled 2.4 million fish, and was virtually identical to the 20 year long term average run of 2.3 million to this district (Table 1). Sockeye escapement requirements totaled 1.3 million, leaving a probable season harvest of 1.2 million. As usual, the Wood River system sockeye return was expected to dominate the run and account for over 70% of this district's total run (Table 1). Igushik and Nuyakuk River systems were forecast to produce total returns which would allow minimal harvests after escapement requirements (Table 1).

Management of Nushagak's salmon resource is made more difficult by the multi-species aspect of this district's salmon runs, and by occurrence of more than one major sockeye salmon producing river system. Nushagak district has accounted for over 71% of Bristol Bay's commercial production of king salmon, and is the only area with a major directed commercial effort aimed at kings. Additionally, this district produces large numbers of chums (52% of the total Bay production), even-year pinks (87% of total) and coho salmon (57% of total).

Preseason surveys of expected fishing and processing effort indicated that over 450 drift units and 200 set units would participate in the Nushagak fishery.

Drift units peaked on June 12-16 at 430 during the king fishery, and on July 2-8 at 450 units during the sockeye fishery. Set net gear peaked in late June-early July at 164 units (Table 16).

In total, 19 different processors operated in Nushagak in 1978 in a variety of production modes (Table 30). Available processing capacity in this district was increased over previous years. In addition to the three major shore-based canneries, floating freezer ship operations increased to six in 1978 from 3 in 1977, while seven processors airlifted fresh salmon out of Nushagak district (Table 30). Brine tendering of salmon was also emphasized this season with six processors tendering fish to plants in Naknek-Kvichak and Egegik districts, or to canneries outside of Bristol Bay (Table 30).

King salmon accumulative commercial catches up to the weekend closure on June 10 were over 23,000, compared with the long term average of 8,000 through June 8. The king run appeared to be both large and early, and when fishing resumed on June 12 after a 48 hour weekend closure, the daily catches and CPUE were the highest recorded since 1958 when adequate comparative data collection was first initiated.

A strong NE wind on June 13 which continued through June 14, brought the kings up off the bottom and began a strong push into the district. By the evening of June 14 it was apparent that the catch would go about 40,000 fish for the first two days of the period. Although upriver subsistence nets indicated good escapement to date (70 kings at Lewis Pt.; 40 at Portage Creek; and 200-300 kings at Ekwok), the heavy catches prompted a decision to let the fishery close 24 hours prior to the normal closure on June 17 (Table 12). The four day opening from June 12-16 saw 56,000 kings enter the harvest bringing the accumulative catch to 79,000 kings compared with the long term average catch of 25,000 through June 15 (Table 16). At least one major processor suspended operations for 26 hours on

June 14-15 when heavy king catches exceeded that plants daily processing capacity. In addition to the large king catch through June 16, the chum salmon harvest of over 27,000 fish was the largest ever recorded since adequate records were first initiated in 1960.

With indications of a good king escapement, as evidenced by strong up-river subsistence catches, and the unusually strong incidental chum catches, which were over seven times the average catch by this date, a 12 hour period was allowed on June 20, with the fishing area pulled back to the Nichols Hills-Etolin Point boundary line (Table 12). Many fishermen changed to "red gear" for this period, and catches totaled 208,000 fish with chums dominating (68%) the catch (60,000 sockeye, 8,000 kings and 141,000 chums)(Table 16).

A second 12 hour fishing period was announced for June 23-24 based on the strong chum catches to date, and with the intention of fishing prior to arrival of the main body of Nuyakuk River sockeye, which could not withstand a high harvest rate if the forecast were correct. The June 23-24 period produced lower CPUE on both sockeye and chums, and a total 124,000 fish (67,000 sockeye, 6,000 kings and 51,000 chums)(Table 16).

The accumulative sockeye, king and chum salmon catches through June 24 had now reached 128,000, 94,000 and 219,000, respectively (Table 16). Of particular interest was the age composition of the sockeye and chum catches: sockeye - catches to date were running heavily (70-80%) to 5 year old fish compared with the forecast of 29%; and chums - a heavy proportion (72%) of fish caught through June 24 were 5 year old fish, compared with the long term age composition records which indicate that Nushagak chums are primarily (84%) 4 year old fish.

The Nushagak outside test boat was sent on a complete circuit of Nushagak Bay on June 25-26 to determine if significant numbers of sockeye were moving into the district on the heels of the June 23-24 period (Table 10). The test

boat catches indicated that very few fish were in or entering the district, although one test set at Lewis Point in Nushagak River indicated significant numbers of sockeye salmon had ascended the river (Table 10). Further analysis of stock separation test fish catches in Nushagak River at Lewis Point on June 25 (40 sockeye and 30 chums), June 26 (31 sockeye and 60 chums) and June 27 (31 sockeye and 62 chums) and at Portage Creek on June 25 (25 sockeye and 100 chums); led to the conclusion that a major escapement of both sockeye and chum had occurred. Even though a rough proration estimate of sockeye caught to date showed that the forecast of 60,000 Nuyakuk sockeye had already been harvested, all data and evidence indicated a Nuyakuk sockeye run stronger than that forecast. Based on the foregoing, the accelerated escapement trends in Wood (38,000) and Igushik (32,000) Rivers (both of which were record levels by June 27) and the need to continue to assess the incoming run strength, a 12 hour period was announced for June 28 (Table 12).

The period on June 28 was expected to produce a catch of between 200-500,000 fish. The actual catch of 659,000 (546,000 sockeye) was an all-time record high catch for a 12 hour period for this district (Table 16). Catches were particularly heavy in the upper district (Combine Flats) and on Clarks Point beach where 20 set nets caught 87,000 fish (Table 17). Good catches were also made in the lower Bay indicating that additional fish were continuing to push into the district.

The accumulative sockeye harvest through the record catch on June 28 was now 673,000 (table 16), with a probable river system proration of: Wood: - 285,000; Igushik - 63,000; Nuyakuk - 280,000; and Nushagak-Mulchatna - 43,000. It was now readily apparent that the Nuyakuk sockeye run was much stronger than forecast.

Through June 28 the sockeye escapement to both Wood and Igushik Rivers were ahead of normal trends. The Wood River escapement rate began to accelerate on June 29 when over 167,000 sockeye were enumerated, bringing the escapement up to

219,000, or 27% of the escapement goal (Table 26). Igushik River had accounted for 51,000 sockeye or 34% of the escapement goal through June 29 (Table 27). Both Wood and Igushik Rivers showed increasing escapement trends on aerial surveys flown on June 30 (Tables 26 and 27), although the daily sockeye escapement at Wood River decreased somewhat due to the heavy fishing success on June 28.

The outside Nushagak test boat began another scheduled trip on June 30 to check on sockeye run strength moving into the district. Exceptional sockeye catch indices were made from Grassy Island off Dillingham to well below Ekuk, which indicated a strong push of fish was taking place (Table 10).

Verification of inriver strength came from aerial surveys flown on July 1 when Wood River was estimated to have 65,000 sockeye below the counting station, and Igushik River showed 18,000 (Tables 26 and 27). Wood and Igushik Rivers were estimated to have received 54% and 63% of their respective escapement goals through July 1.

Another 12 hour period was announced for July 2 as escapements continued to improve in Wood and Igushik Rivers. All major Nushagak processors placed their fishing fleets on restrictive limits for the July 2 period. The catch for July 2 increased to 743,000 fish, and sockeye CPUE continued to increase (Table 16). The 12 hour period was extended for an additional 12 hours in the Igushik section when the Igushik sockeye run continued to show strength in the fishery (Table 17), and the river escapement was expected to reach 80% of the goal (Table 27).

After a short closure to assess continuing sockeye run strength on July 3, the fishery was reopened on July 4 for a 12 hour period, and was subsequently extended until July 15, when daily escapement tower counts and aerial surveys on July 4 indicated that escapement goals would be exceeded in both Wood and Igushik Rivers (Tables 26 and 27).

Heavy daily total catches continued on July 4 (207,000), July 5 (144,000) and then peaked again on July 6 (560,000), showing the same bimodal run entry pattern that had manifest itself at Naknek-Kvichak and Egegik. Over 1.3 million fish of all species were caught from July 4-8, and all processors were on restrictive limits (generally 12,000 lbs. for 2-man drift boats and 6,000 lbs. for skiffs and set nets), and/or regulated their own fishing schedule to match catches with daily processing capacity.

The 1978 sockeye return to Nushagak district was perhaps the most exciting season this area has seen since the "hey-days" of the Bristol Bay fishery in the early 1900's. The 1978 season can be favorably compared with sockeye runs to this district from the early 1900's through the 1930's, the period of time when Nushagak production peaked.

The total sockeye return amounted to 6.7 million, the largest since both catch and escapement estimates were first available in the late 1940's, and was well above the recent 20 year largest run of 4.7 million in 1959. The total sockeye return in 1978 was the largest since 1946, when just over 6.7 million returned to Nushagak district.

Total Nushagak district sockeye catch totaled 3.2 million, the largest since 1944, and 3½ times the recent long term average, while the entire district sockeye escapement of 3.5 million was the largest since 1946 when 4.7 million were estimated to have escaped the fishery (Table 4). The sockeye escapement of 2.3 million into Wood River was the third largest ever recorded, exceeded only by 2.6 million in 1908 and 3.7 million in 1946. Final sockeye escapements to Igushik (536,000) and Nuyakuk (577,000) Rivers were both "second best ever" for these river systems (Table 4).

Earlier concern over sockeye run strength to the Nuyakuk River system was of little consequence, as this system produced 1.4 million sockeye compared with the forecast of 310,000 (Table 1).

Nushagak district's "second season" commences about mid-July and is targeted on pink salmon. The pink preseason forecast for 3.2 million fish was expected to allow a harvest of 2.4 million fish after escapement requirements of 800,000 were assured. Nushagak's even-year pink salmon runs have averaged 2.0 million fish since 1958, and show a relatively "tight" range of returns (0.1 million in 1972 to 5.1 million in 1958). Although the upper range of the forecast was placed at 4.0 million fish, there was no additional information which indicated a run significantly larger than forecast. Even though the forecast accuracy for past Nushagak pink returns was poor, a run within the historical range of 0.1 to 5.1 million was expected.

Pink salmon caught incidental to the sockeye fishery prior to July 16 in larger mesh sockeye gear, totaled 10,000 fish compared with the long term average of 8,000 through this date (Table 16). Fishing resumed on a 5 day-per-week basis on July 17, and by the weekend of July 22-23, a disappointing catch of 439,000 had been taken by approximately 350 drift units and 150 set units (Table 16). In view of the preseason forecast and normal run entry pattern, a catch of about 800-900,000 was expected. The relatively poor weekly showing and a counted escapement of less than 4,000 fish through July 23 prompted a decision to let the fishery close for a normal 48 hour weekend closure, followed by a 24 hour "test fishery" scheduled for July 24-25 (Tables 12 and 21).

The 24 hour test fishery catch of 763,000 fish (745,000 pinks) showed conclusively that a strong run was in progress, but additional fishing time was delayed due to the low observed escapement (Table 16). Aerial surveillance of lower Nushagak River was intensified, but through July 24, total pink escapement was estimated at only 100,000 fish compared with a commercial harvest of 1.2 million (Tables 16 and 28).

Another aerial survey flown on the evening of July 26 showed good numbers of fish (38,000) just coming out of muddy water at Black Point (Table 28). After

a 45 hour closure the fishery was reopened on July 27 for a 12 hour period, with the intention of further extended fishing time if the aerial survey showed continued pink strength on the morning of July 27 (Table 12).

An early morning aerial survey of lower Nushagak River on July 27 (Table 28), disclosed large numbers of pinks (10 to 40 wide on both banks and well over 300,000 pinks from Black Point to Portage Creek, a distince of 20 miles). The on-going fishery was also strong throughout the district and a minimum catch of 500,000 pinks was estimated for July 27. With an accumulative catch approaching 2.0 million fish, and an estimated escapement of "well over" 300,000 fish from Black Point to Portage Creek, and additional fish between the open fishing area and Black Point, the fishery was extended for 39 hours through 9:00 a.m., July 29 (Table 12).

Unlimited fishing time was announced on July 28, when aerial surveillance of Nushagak River showed over 500,000 pinks from Black Point to Portage Creek, with the fishery continuing strong (Table 28).

For the next nine days (July 27-August 4), Nushagak fishermen caught over 2.8 million pink salmon, or 315,000 pinks per day (Table 16). These high daily catch rates and the lack of a significant number of processors (3 land-based and 1 floater), resulted in untold processing problems. With the pink run accelerating and over 1.0 million pinks available on a daily basis in the fishery from August 1-8, Nushagak processors (with a 320,000 fish per day capacity) fell steadily behind. For the first eight days in August the pinks arrived at the rate of 1.0 million per day, and from August 1-12, 9.5 million fish (800,000 per day) were estimated to have returned to Nushagak district.

Catch restrictions, limits and suspensions were common from July 24 onward, and it was conservatively estimated that processor fishing suspensions alone cost the fishermen 900,000 fish in lost harvest.

When the magnitude of the pink run was fully understood in early August, discussion centered around whether or not to allow foreign processing into Nushagak Bay to help the domestic industry handle the run. The decision was finally made to allow foreign processing to move into Nushagak to help process pinks, but by this time the pink run had peaked and was declining steadily each day. Those foreign operations which were interested in Nushagak pinks declined participation when it became apparent that the Nushagak pink run was on the decline.

The total district pink salmon run eventually reached 13.7 million, over 4 times higher than the preseason forecast of 3.2 million (Table 5). The pink catch amounted to 4.3 million, largest in the history of the fishery, while the escapement of 9.4 million was over twice the previous recorded highest of 4.0 million in 1958 (Table 5).

The commercial harvest of 8.4 million salmon of all species in Nushagak district in 1978 was an all-time record harvest for this 86 year old fishery, and 4 times higher than the 20 year average of 1.8 million fish (Table 19).

Nushagak district king salmon accounted for 106,000 of the district harvest, which was above the long term average of 67,000, and with the escapement of 130,000 (also a record), equaled a total run of 236,000 fish (Table 19).

The Nushagak chum salmon catch of 664,000 was also well above the long term average of 335,000 for this district (Table 19). The chum escapement was over 293,000 fish, and the total run equaled a run of 1.0 million.

Increased late season fishing activities in Nushagak, directed primarily at pink salmon, pushed the coho harvest to 46,000 fish, almost twice the long term average of 26,000 (Table 19).

Togiak District

Togiak district is not managed under the same concept as the other Bristol Bay salmon districts. Open fishing periods at Togiak are established in advance and then adjusted via emergency order inseason, as needed, to achieve the desired balance between catch and escapement.

This type of management strategy has developed because the run timing is more drawn out, the number of fishing units is fairly stable, and the processing capacity is relatively low. In 1978 the run was very strong and 12 different companies operated in the Togiak district, however, only three processors stayed the entire season (Table 30).

The 1978 preseason forecasted sockeye salmon return was 289,000 while the actual return of 793,000 was over 2½ times larger than predicted and was the district's largest run ever documented (Table 1). It was evident by the last week of June when the accumulative sockeye catch had reached over 70,000 that a very strong run was in progress (Table 18). The long term average catch through late June is 21,000. By July 1 the accumulative escapement had already reached 19% of the desired goal and was increasing at a strong, steady daily rate in spite of the large daily commercial catches (Table 20).

This high catch and strong escapement continued throughout the season and by July 11 the goal of 100,000 sockeye had passed the counting tower (Table 20). The fixed weekly fishing periods were extended for 36 hours three times during the 1978 season; on July 14, 21 and 28 to allow for additional harvest (Table 12). There was constant fishing effort throughout the season but several times restrictive limits were imposed by the major processors that did inhibit the total catch to some extent. Most of the time these limits were in effect, cash buyers were able to take up the excess fish and the fleet continued to operate at near full capacity throughout the season.

The king salmon harvest at Togiak in 1978 set a new record and the catch of 56,000 was over 20,000 higher than the previous record of 35,000 set in 1977 (Table 19). The aerial survey estimates of king escapement totaled 40,000 fish, and the total run 96,000, the largest ever recorded.

The chum salmon catch at Togiak also broke a record in 1978 with a harvest of 277,000 which bested the 1977 catch of 271,000 (Table 19). The chum escapements district-wide amounted to 396,000 and the total run topped 673,000 fish, the second largest on record since total run estimates are available.

The Togiak River system also has an "even-year" pink salmon run, but until the 1976 harvest of 28,000, and 1978 catch of 57,000, it has been of minor importance (Table 19). The 1978 season again established a new record harvest for this species. Specific pink salmon escapement surveys are not conducted in the Togiak district, but incidental observations on king and chum aerial surveys indicated an escapement of approximately 150,000 fish.

The 1978 coho salmon catch of 34,000 was only bested twice in the past 20 years, and was well ahead of the long term average catch of 10,000 (Table 19). There has been a history of problems with illegal "up-river" fishing of the Togiak coho stock and this situation was reduced this season by an intensive patrol effort by Department of Public Safety, Fish and Wildlife Protection.

1978 SUBSISTENCE SALMON FISHERY

Since 1963 the Department has been monitoring and maintaining records of subsistence harvests in the major river systems of Bristol Bay. The advent of the snow machine has replaced the dog sled as a means of winter travel which has resulted in a substantial decrease in fish requirements to feed dogs. However, the increase in population and better documentation of subsistence harvests has resulted in an overall increase of fish taken for personal use.

Salmon subsistence catches in Bristol Bay generally approach a season total of between 100 and 200,000 fish, and since 1963 has averaged 138,000. In 1978 catch records indicate a subsistence harvest of 169,000 salmon were taken for personal use by 773 permit holders (Table 34).

1978 COMMERCIAL HERRING FISHERY

Introduction

Commercial utilization of herring first occurred in Bristol Bay during the late 1960's when fledgling sac roe and roe-on-kelp fisheries developed in the Togiak district. Early years of the fishery were characterized by variable and fluctuating production due to limited fishing and processing capacity along with annual variations in fish abundance and the general logistical difficulties of operating in the area. Escalated growth in the catch and production capacity during the past few years has resulted in rapidly increasing catches in both the sac roe and roe-on-kelp fisheries.

Herring Sac Roe Fishery

The first domestic commercial herring sac roe fishery in Bristol Bay occurred in 1967 when a single operator purchased 122 metric tons (m.t.) of fish. These first catches were taken with gill nets exclusively and this type of gear has been used successfully each year that the fishery has operated. During the 11 year history of this fishery, purse seines have also been employed and since they

were first introduced in 1968 have taken an average of 70% of the catch. No herring harvests were reported in Bristol Bay in 1971 and 1976. Annual catches during other years remained small until 1977 and 1978 when the number of operators and amount of fishing effort increased dramatically and resulted in record catches of 2,500 and 7,000 m.t. respectively.

During 1978 a total of 16 operators purchased 7,000 m.t. of herring in Bristol Bay (Tables 30 and 36). Over 80% of the harvest was taken from the Nunavachak section with lesser amounts coming from the remainder of the Togiak district. Ninety-one percent of the catch was taken by 25 units of purse seine gear while the balance was taken with 40 units of gill net gear (Table 36). The peak daily harvest occurred on May 24 when 1,600 m.t. were delivered (Table 36). Most of the herring taken this past season were primary processed on the fishing grounds and subsequently transferred aboard 11 foreign vessels anchored in a designated constructive port within Kulukak Bay.

The mean roe recovery in Bristol Bay was 8.2% and, although there was a wide range of prices paid for the fish, an average of $300 per short ton put the ex-vessel value of the sac roe fishery at $2.3 million.

Herring Roe-on-Kelp Fishery

The commercial herring roe-on-kelp fishery originated in Bristol Bay in 1968 and has operated annually since that time. For the first six seasons one processor was involved and only limited harvests resulted. Since 1974 there has been a steady increase in effort and production culminating in a doubling of the number of buyers from 5 to 11 and a record harvest of 150 m.t. in 1978 (Tables 30 and 32). The product being harvested is almost exclusively rockweed kelp and although ribbon kelp (Laminaria sp.) is present, it doesn't appear to be an important substrate.

The record roe-on-kelp harvest in Bristol Bay in 1978 was taken by 160 different individual fishermen. Eleven different processors participated and

paid approximately $120,000 to fishermen for the combined harvest (Table 30).

The prospects for the roe-on-kelp fishery in Bristol Bay indicate continued expansion in effort and processing capacity but the market for rockweed kelp may be a limiting factor. The effect of the harvest on the kelp flora will also require close monitoring as the fishery develops.

Entry Timing

Earlier Department studies showed that timing of coastal spawning of herring in Eastern Bering Sea was influenced by climatological conditions. The winter of 1977-78 was especially mild, and herring arrived on the Togiak spawning grounds earlier than normal. Aerial surveys flown this year indicated arrival of herring and peak spawning occurred about mid-May.

Waves of spawning were observed in most areas in 1978. Analysis of herring samples from Metervik Bay revealed that temporal differences in herring size and age composition occurred. Older herring were the first to arrive on the spawning grounds while younger herring appeared later.

Aerial Biomass Surveys

Twenty surveys were flown in the Togiak district from May 2 through June 20. A total of 2,950 herring schools were observed in six major index areas and each school was categorized by size. A total of 41.2 linear miles of milt (spawn) was recorded on 14 survey days, with peak of spawning based on these observations occurring between May 11-14.

The most critical step in estimating herring biomass from aerial survey data is the application of tonnage conversion factors. The conversion of surface area biomass was based on only three samples of seined herring in the Togiak district: 6.7 m.t. and 11.0 m.t. per 50 m^2 of school surface area in Nunavachak Bay, and 2.4 m.t. per 50 m^2 in Ungalikthluk Bay (Table 35). Daily ranges of herring biomass for each index area were obtained by multiplying relative abundance

indices (RAI's) by the tonnage conversions (Table 35). Actual conversions varied among areas and were value judgments made by aerial surveyors to compensate for differences in relative water depth.

The largest probability of error associated with application of tonnage conversion factors exists in the Togiak Bay and Nushagak Peninsula census areas. These two areas are believed to be major staging areas for post-spawning herring prior to departure from the Togiak region. Mixing of pre-spawners, spawners and post-spawners during the spawning season in the Togiak region has yet to be quantified, but is believed to be substantial. Because of the probability of error associated with double counting fish schools, fish biomass abundance was estimated by analyzing daily ranges of biomass for all six index areas combined. The best estimate of abundance in 1978 was 230 to 411,000 m.t. based on results of the May 13 survey (Table 35).

A critical factor which must be considered in assessing herring abundance from aerial survey observations is the occurrence of other fish species (capelin, smelt and cod), the timing of which coincides with herring spawning runs. Aerial surveyors cannot consistently distinguish between these species. The overall proportion of herring captured in 1978 with test nets throughout the Togiak district was 75%. Neither the aerial survey or the test fishing data base is adequate to permit applying a specie percent composition factor to each index area for the entire season, much less on a daily basis. Therefore, the overall average herring percent composition (75%) was considered as the basis for making adjustments to aerial biomass estimates to compensate for the occurrence of non-herring species.

To obtain an estimate of herring biomass in 1978, the range of biomass estimates has been reduced by 25% for each index area. These adjustments result in a peak herring abundance on May 13 of 173 to 308,000 m.t. (Table 35). This

post-season abundance estimate complements the inseason estimate of 100 to 200,000 m.t. of herring made during the course of the season surveys.

Exploitation Rate

Commercial harvest of sac roe herring from the Togiak district totaled over 7,000 m.t. in 1978, and constituted 2.2 to 4.0% of the estimated spawning herring biomass range (Table 35). Although these rates of exploitation are well below those which have been permitted in the management of most other Pacific herring fisheries, the rapid rate of development of Bering Sea herring fisheries and the inadequate knowledge of the stocks warrant a conservative management approach. Consequently, in view of the variables associated with determining herring biomass from aerial surveillance, the low range of estimates are considered as the best estimate of spawning biomass.

TABLE 1. Sockeye salmon inshore run by system compared with the pre-season inshore forecast, escapement goals and forecasted inshore harvest, Bristol Bay, 1978.[1/]

District and River System	Inshore Forecast			Escapement				Inshore Harvest		
	Forecast[2/]	Actual	Run/Fore.	Goal	Range	Actual[3/]	Esc/Goal	Forecast	Actual[3/]	Harv./Fore.
NAKNEK-KVICHAK DISTRICT:										
Kvichak River	5,089	7,712	1.52	2,000	1,500-2,500	4,149	2.08	3,089	3,563	1.15
Branch River[4/]	260	469	1.80	185	150- 220	229	1.24	75	240	3.20
Naknek River	1,697	2,001	1.18	800	700- 900	813	1.02	897	1,188	1.32
Totals	7,046	10,182	1.45	2,985	2,350-3,620	5,191	1.74	4,061	4,991	1.23
EGEGIK DISTRICT:	1,524	2,099	1.38	600	500- 700	896	1.49	924	1,203	1.30
UGASHIK DISTRICT:[5/]	247	80	.32	500	400- 600	70	.14	0	10	10.00
NUSHAGAK DISTRICT:										
Wood River	1,720	4,026	2.34	800	600-1,000	2,267	2.83	920	1,759	1.91
Igushik River	243	1,018	4.19	150	100- 200	536	3.57	93	482	5.18
Nuyakuk River[4/]	310	1,400	4.52	250	200- 300	577	2.31	60	823	13.72
Nushagak-Mul. Sys.[4/]	136	223	1.64	40	20- 60	87	2.18	96	136	1.42
Snake River[4/]	19	58	3.05	30	10- 50	18	.60	0	40	40.00
Totals	2,428	6,725	2.77	1,270	930-1,610	3,485	2.74	1,169	3,240	2.77
TOGIAK DISTRICT:	289	793	2.74	100	80- 120	340	3.40	189	453	2.40
TOTAL BRISTOL BAY	11,534	19,879	1.72	5,455	4,260-6,650	9,982	1.83	6,343	9,897	1.56

1/ All figures in thousands of fish. Due to rounding, some totals in this table may not agree with data presented in Table 2.
2/ Final Bristol Bay sockeye salmon forecast of inshore run for 1978.
3/ Escapement data is final, while catch data is preliminary.
4/ These systems cannot be managed separately from the major system in the district. Consequently, the harvest rates are merely the harvest rates anticipated for the major system in the district; the corresponding escapement goals do not necessarily coincide with the escapement levels which would be achieved if these systems could be managed independently.
5/ Excluding Mother Goose system sockeye salmon run.

Table 2. Inshore forecast of sockeye salmon age class return by river system and district, Bristol Bay, 1978.[1/]

District/System	Age Class (Brood Year) 4_2(1974)	5_3(1973)	2-Ocean	Age Class (Brood Year) 5_2(1973)	6_3(1972)	3-Ocean	Total
NAKNEK-KVICHAK DISTRICT							
Kvichak River	4,484	170	4,654	278	157	435	5,089
Branch River	142	22	164	84	12	96	260
Naknek River	242	296	538	596	563	1,159	1,69
Total	4,868	488	5,356	958	732	1,690	7,04
EGEGIK DISTRICT	73	463	536	115	873	988	1,524
UGASHIK DISTRICT	30	52	82	121	44	165	247
NUSHAGAK DISTRICT							
Wood River	1,435	60	1,495	199	26	225	1,72
Igushik River	98	19	117	108	18	126	24
Nuyakuk River	76	15	91	206	13	219	310
Nush.-Mulch.	16	8	24	93	19	112	13
Snake River	13	1	14	4	1	5	1
Total	1,638	103	1,741	610	77	687	2,42
TOGIAK DISTRICT	56	42	98	174	17	191	28
TOTAL BRISTOL BAY[2/]	6,665	1,148	7,813	1,978	1,743	3,721	11,534

1/ The 1977 Japanese high seas catch of 2-ocean immature Bristol Bay sockeye salmon has been deducted from the 3-ocean forecast return; number of fish in thousands.

2/ Sockeye salmon of several minor age classes would be expected to contribute an additional 1-2 percent to the total return.

TABLE 3 . Sockeye salmon inshore run by age class, district and river system, Bristol Bay, 1978. 1/

District and River System		Age Class 4_2	5_3	2-Ocean	5_2	6_3	3-Ocean	Tota
NAKNEK-KVICHAK DISTRICT								
Kvichak River								
	No.	5,737	246	5,983	1,061	342	1,403	7,38
	%	77.7	3.3	81.0	14.4	4.6	19.0	100.
Branch River								
	No.	283	20	303	136	9	145	44
	%	63.2	4.4	67.6	30.4	2.0	32.4	100.
Naknek River								
	No.	220	429	649	769	537	1,306	1,95
	%	11.3	21.9	33.2	39.3	27.5	66.8	100.
Totals								
	No.	6,240	695	6,935	1,966	888	2,854	9,78
	%	63.7	7.1	70.8	20.1	9.1	29.2	100.
EGEGIK DISTRICT								
	No.	134	527	661	138	1,190	1,328	1,98
	%	6.7	26.5	33.2	7.0	59.8	66.8	100.
UGASHIK DISTRICT								
	No.	11	15	26	6	35	41	6
	%	16.4	22.4	38.8	9.0	52.2	61.2	100.
NUSHAGAK DISTRICT								
Wood River								
	No.	2,782	62	2,844	1,086	33	1,119	3,9
	%	70.2	1.6	71.8	27.4	0.8	28.2	100.
Igushik River								
	No.	326	22	348	644	12	656	1,0
	%	32.5	2.2	34.7	64.1	1.2	65.3	100.
Nuyakuk River								
	No.	118	0	118	1,150	95	1,245	1,3
	%	8.7	0	8.7	84.3	7.0	91.3	100.
Nushagak-Mulchatna								
	No.	6	6	12	167	9	176	1
	%	3.2	3.2	6.4	88.8	4.8	93.6	100
Snake River								
	No.	41	12	53	4	0	4	
	%	71.9	21.1	93.0	7.0	0	7.0	100
Totals								
	No.	3,273	102	3,375	3,051	149	3,200	6,5
	%	49.8	1.5	51.3	46.4	2.3	48.7	100
TOGIAK DISTRICT								
	No.	226	28	254	392	55	447	7
	%	32.2	4.0	36.2	55.9	7.9	63.8	100
TOTAL BRISTOL BAY								
	No.	9,884	1,367	11,251	5,553	2,317	7,870	19,1
	%	51.7	7.1	58.8	29.1	12.1	41.2	100

1/ The inshore run data does not include the 1978 Japanese high seas catch of maturing Bristol Bay sockeye or the 1977 Japanese catch of immatures. Return in thousands of fis
2/ Excluding 33,900 fish (escapement from Kulukak system) for which no age data is availabl
3/ Approximately 724,000 additional sockeye salmon of several minor age classes returning in 1978 are not included in this total.

TABLE 4. Sockeye salmon catch and escapement, Bristol Bay, 1978.1/

District and River System	Sockeye Salmon Catch	Escapement	Total Run
NAKNEK-KVICHAK DISTRICT			
Kvichak River	3,562,689	4,149,288	7,711,977
Branch River	239,551	229,400	468,951
Naknek River	1,188,403	813,378	2,001,781
Totals	4,990,643	5,192,066	10,182,709
EGEGIK DISTRICT	1,202,679	895,698	2,098,377
UGASHIK DISTRICT	10,111	70,434	80,545
NUSHAGAK DISTRICT			
Wood River	1,759,250	2,267,238	4,026,488
Igushik River	481,794	536,154	1,017,948
Nuyakuk River	822,649	576,666	1,399,315
Nushagak-Mul. Sys.	135,942	87,000	222,942
Snake River	39,983	18,074	58,057
Totals	3,239,618	3,485,132	6,724,750
TOGIAK DISTRICT			
Togiak Lake		273,576	
Togiak River		15,000	
Togiak Tributaries		17,600	
Kulukak System		33,900	
Totals	452,614	340,076	792,690
TOTAL BRISTOL BAY	9,895,665	9,983,406	19,879,071

1/ Final escapement data, however inshore catch is preliminary and apportionment of the inshore catch by river system to the Naknek-Kvichak and Nushagak district is preliminary.

Table 5. Pink salmon inshore catch and escapement, Bristol Bay, 1978.[1]

District and River System	Pink Salmon Catch	Pink Salmon Escapement	Pink Salmon Total Run
NAKNEK-KVICHAK DISTRICT			
Kvichak River		440,000	
Branch River		736,000	
Naknek River		780,000	
Totals	734,880	1,956,000	2,690,880
EGEGIK DISTRICT	11,430	--	11,430
UGASHIK DISTRICT	530	--	530
NUSHAGAK DISTRICT			
Wood River		205,000	
Igushik River		16,210	
Nuyakuk River[2]		7,190,184	
Nuyakuk River[3]		1,200,000	
Nushagak River		771,600	
Mulchatna River		0	
Snake River		3,483	
Totals	4,348,336	9,386,477	13,734,813
TOGIAK DISTRICT	57,524	150,000	207,524
TOTAL BRISTOL BAY	5,152,700	11,492,477	16,645,177

1/ All figures are final.
2/ Up-river from the counting tower.
3/ Down-river from the counting station.

TABLE 6. Summary of Port Moller sockeye catch, mean weight, index values, and estimated passage by day, 1978.

Date	Number of Stations	Mean Weight	Catch	Cumulative Catch	Index[1/]	Cumulative Index	Passage[2/]	Cumulative Passage
6/11	6	6.33	13	13	5.890	5.890	135,354	135,354
12	5	7.43	3	16	1.490	7.380	11,450	146,804
13	6	6.82	14	30	6.550	13.930	73,432	220,236
14	2	0.	0	30	2.442	16.372	28,311	248,547
15	6	5.76	13	43	6.660	23.032	145,438	393,985
16	3	5.82	2	45	4.650	27.682	82,271	476,256
17	0	0.	0	45	4.734	32.416	65,403	541,659
18	5	6.61	10	55	4.850	37.266	58,967	600,626
19	6	6.66	17	72	8.310	45.576	99,231	699,857
20	5	6.36	60	132	26.413	71.989	440,875	1,140,732
21	0	0.	0	132	38.919	110.908	521,907	1,662,639
22	0	0.	0	132	50.443	161.351	676,445	2,339,084
23	0	0.	0	132	52.215	213.566	700,207	3,039,291
24	5	5.93	72	204	42.552	256.118	757,620	3,796,911
25	6	6.29	39	243	22.042	278.160	331,575	4,128,486
26	2	6.22	13	256	15.786	293.946	236,219	4,364,705
27	0	0.	0	256	22.991	316.937	341,511	4,706,216
28	0	0.	0	256	26.505	343.442	393,708	5,099,924
29	6	5.86	52	308	24.860	368.302	488,765	5,588,689
30	5	6.06	34	342	14.982	383.284	256,381	5,845,070
7/ 1	6	6.24	56	398	25.450	408.734	447,009	6,292,079
2	3	6.68	16	414	16.035	424.769	250,443	6,542,522
3	6	6.04	47	461	22.620	447.389	404,691	6,947,213
4	5	5.60	24	485	11.830	459.219	307,527	7,254,740
5	6	5.33	17	502	9.070	468.289	281,544	7,536,284
6	5	5.33	23	525	11.380	479.669	318,779	7,855,063
Total	99	6.09		525		479.669		7,855,063

1/ Indices expressed in fish/100 fathom hours and includes interpolations for missed days and stations.
2/ The daily passage (expressed in numbers of fish) is the sum of the estimates for individaul stations for that day which are calculated by multiplying the station index by a passage rate adjusted by the [illegible] of fis

TABLE 7. Summary of Port Moller chum catch, mean weight, index values, and estimated passage by day, 1978.

Date	Number of Stations	Mean Weight	Catch	Cumulative Catch	Index[1/]	Cumulative Index	Passage[2/]	Cumulative Passage
6/11	6	0.	13	13	6.600	6.600	57,618	57,618
12	5	0.	10	23	5.070	11.670	44,260	101,878
13	6	7.31	25	48	11.800	23.470	103,014	204,892
14	2	0.	8	56	5.817	29.287	50,783	255,675
15	6	6.95	3	59	1.500	30.787	13,095	268,770
16	3	7.97	8	67	3.981	34.768	34,754	303,524
17	0	0.	0	67	4.811	39.579	42,000	345,524
18	5	7.55	11	78	5.450	45.029	47,579	393,103
19	6	6.90	8	86	3.640	48.669	31,777	424,880
20	5	7.56	17	103	8.480	57.149	74,030	498,910
21	0	0.	0	103	8.926	66.075	77,924	576,834
22	0	0.	0	103	6.165	72.240	53,820	630,654
23	0	0.	0	103	4.507	76.747	39,346	670,000
24	5	7.36	4	107	1.894	78.641	16,534	686,534
25	6	6.60	8	115	7.040	85.681	61,460	747,994
26	2	9.06	5	120	7.473	93.154	65,240	813,234
27	0	0.	0	120	8.800	101.954	76,824	890,058
28	0	0.	0	120	6.576	108.530	57,409	947,467
29	6	7.07	11	131	4.790	113.320	41,817	989,284
30	5	6.02	3	134	1.450	114.770	12,658	1,001,942
7/ 1	6	7.19	9	143	4.100	118.870	35,793	1,037,735
2	3	0.	4	147	4.817	123.687	42,052	1,079,787
3	6	7.58	12	159	8.000	131.687	69,839	1,149,626
4	5	7.08	3	162	1.530	133.217	13,356	1,162,982
5	6	0.	1	163	0.530	133.747	4,627	1,167,609
6	5	9.02	3	166	1.570	135.317	13,707	1,181,316
Total	99	7.38		166		135.317		1,181,316

1/ Indices expressed in fish/100 fathom hours and includes interpolations for missed days and stations.
2/ Estimated inshore run of chum salmon is the product of the daily index and the historic inshore run/offshore index ratio of 8,730 (1968-77).

Table 8 . Summary of outside test fishing indices in the Naknek-Kvichak district by index area and date, 1978. 1/

Index Area	Date 7/1	7/2	7/3	7/4
Naknek River (1)	100 2/	182 3/	107 2/	405
Middle Naknek (2)	13	129 6/	1100	128 4/
Johnston Hill (3)				
Low Point Onshore (4)				
Low Point Offshore (5)				
Middle Channel (6)		73 3/		
Ships Anchorage (7)	499			
Pederson Point (8)	107		2264 4/	1750 2/
Graveyard (9)	686 2/		1000	2533 5/
Salmon Flats (10)	0		1598 3/	944 2/
Alberts Channel (11)	91			
Gravel Spit (12)				
Half Moon Bay (13)				
Deadman Sands (14)				
Low Point-Middle Bluff (15)				
Middle Bluff (16)				

1/ All indices expressed in number of fish/100 fathom hours.
2/ Average of two separate drifts in the same general vicinity of the distric
3/ Average of three separate drifts in the same general vicinity of the distr
4/ Average of four separate drfits in the same general vicinity of the district
5/ Average of five separate drifts in the same general vicinity of the distri
6/ Average of six separate drifts in the same general vicinity of the distric

Table 9. Summary of outside test fishing indices in the Egegik district by index area and date, 1978[1/]

Index Area	Date 6/26	6/29	7/1	7/2	7/3	7/4	7/5	7/6
Middle Bluff (1)	333							
N.W. Marker (2)								2,268[3/]
Middle Marker (3)		60	10	489[2/]	14	220[4/]	43[2/]	1,274[3/]
S.W. Marker (4)		371[2/]	3[2/]	147				
South Marker (5)	132		4	106				849
Goose Point (6)				343			18	
Bishops Creek (7)		145[2/]	0	43[2/]	186[4/]	345[5/]	1,246[4/]	
Red Bluff (8)		259[2/]	5[2/]		136			1,608
Chichagof (9)	579							3,780
Coffee Point (10)	1,008	307[2/]	5[2/]	40	35[2/]	0	1,402	
Inside River								

1/ All indices expressed in fish/100 fathom hours to nearest full index point.
2/ Average of two separate drifts in the same general vicinity of the district.
3/ Average of three separate drifts in the same general vicinity of the district.
4/ Average of five separate drifts in the same general vicinity of the district.

Table 10. Summary of outside sockeye salmon test fishing indices in the Nushagak district by index area and date, Bristol Bay, 1978.[1/]

Index Area	Date 6/25	6/26	6/30
Nushagak River		433	
Wood River		17	
Kanakanak Beach			139
Grassy Island		0	16,800
Nushagak Point			
Coffee Point	0		
Combine Flats		0	9,300
Clarks Point			6,583
Ekuk Bluff	4[3/]		7,886
Schooner Channel, N. W.	0		
Schooner Channel, S. E.			
Ships Channel, N. W.	19[2/]		
Ships Channel, S. E.			
Middle Channel, N. W.	23[2/]		
Middle Channel, S. E.	0		
West Channel, N. W.	18[2/]		
West Channel, S. E.	114[2/]		
Dead Man's Spit	0		
Nichols Spit			

1/ All indices expressed in number of fish/100 fathom hours to the nearest full index point.
2/ Average of two consecutive drifts in the same area.
3/ Average of three consecutive drifts in the same area.

Table 11. Fishing effort registration by district, gear type and residency, Bristol Bay, 1978. 1/ 2/

District	Type of Gear			
	Drift	Set	Total	(Percent)
NAKNEK-KVICHAK				
Resident	279	298	577	(53)
Non-resident	459	54	513	(47)
Totals	738	352	1,090	
EGEGIK				
Resident	107	94	201	(50)
Non-resident	132	66	198	(50)
Totals	239	160	399	
UGASHIK				
Resident	38	33	71	(88)
Non-resident	8	2	10	(12)
Totals	46	35	81	
NUSHAGAK				
Resident	492	266	758	(84)
Non-resident	117	26	143	(16)
Totals	609	292	901	
TOGIAK				
Resident	114	32	146	(99)
Non-resident	1	0	1	(1)
Totals	115	32	147	
BRISTOL BAY				
Resident	1,025	721	1,746	(67)
Non-resident	722	150	872	(33)
Totals	1,747	871	2,618	

1/ Does not incorporate district transfers.
2/ District registration based upon 1973 through 1977 average percentages.

Table 12. Bristol Bay emergency order fishing periods and general announcements by district, 1978. 1/

Emergency Order Number 2/	Date and Time	Hours Open
NAKNEK-KVICHAK DISTRICT		
K 1	June 25 3 pm - June 26 3 am	12
K 2	June 27 5 pm - June 28 5 am	12
K 3	June 29 7 pm - June 30 7 am	12
Kvichak section only		
K 5	July 6 12 N - July 6 12 MN	12
K 6	July 6 12 MN - July 17 9 am	10 days, 9 hrs. 3/
Naknek section only		
K 6	July 7 12 N - July 7 12 MN	12
K 8	July 7 12 MN - July 8 12 MN	24
K 9	July 8 12 MN - July 9 1 pm	13
K10	July 13 5 pm - July 14 5 pm	24
K11	July 17 7 am - July 17 9 am	2
EGEGIK DISTRICT		
K 1	June 24 1 pm - June 25 1 am	12
K 2	June 27 3 pm - June 28 3 am	12
K 3	June 30 7 am - June 30 7 pm	12
K 4	June 30 5:30 am - June 30 5:30 pm	12 4/
K 7	July 7 11 am - July 7 11 pm	12
K 8	July 7 11 pm - July 8 12 MN	25
K 9	July 8 12 MN - July 17 9 am	8 days, 9 hrs. 5/
UGASHIK DISTRICT		
K11	July 17 9 am - July 19 9 am	48 6/
K12	July 20 9 am - July 22 9 am	48 7/
NUSHAGAK DISTRICT		
D 2	June 20 11 am - June 20 11 pm	12 8/
D 3	June 23 2 pm - June 24 2 am	12
D 4	June 28 6 am - June 28 6 pm	12
D 5	July 2 10 am - July 2 10 pm	12
D 7	July 4 11 am - July 4 11 pm	12
D 8	July 4 11 pm - July 15 9 am	10 days,10 hrs.
D10	July 15 9 am - July 16 9 am	24
D12	July 25 9 am - July 31 9 am	24 9/
D14	July 27 6 am - July 27 6 pm	12 10/
D15	July 27 6 pm - July 29 9 am	39
D16	July 29 9 am - July 31 9 am	48
D17	August 5 9 am - August 7 9 am	48
Igushik section only		
D 6	July 2 10 pm - July 3 10 am	12

continued

Table 12. (continued)

Emergency Order Number	Date and Time	Hours Open
TOGIAK DISTRICT		
Togiak section only		
D 9	July 14 9 am - July 15 9 pm	36
D11	July 21 9 am - July 22 9 pm	36
D13	July 28 9 am - July 29 9 pm	36
BRISTOL BAY AREA - Herring Fishery		
D 1	Effective April 25	Redefined that portion of Metervik Bay of the Togiak district which is closed to herring fishing.

Commissioners Announcements Number	Date	Description
78-1	April 28	Establishes and describes constructive ports in Nushagak and Kulukak Bays.
78-2	July 6	Permitted a waiver of the 48-hour waiting period prior to relocation of set net gear in the Naknek-Kvichak district.

General Announcements Number	Date	Description
K 1	July 2	The commercial harvest of sockeye salmon in the Naknek-Kvichak district now stands at 1.4 million. Catch per unit of effort declined significantly during the past period. The outside test boat has not detected any significant buildup within the district. The rate of escapement into the Kvichak Rive is currently on the decline. An aerial survey revea a continuing drop in the rate of escapement into the lower part of the river above the fishery. The Nakn River escapement rate is also continuing to decline. Only 15% of the Naknek River goal has been tallied t date and is lagging behind the rate normal for this c In the Egegik district the commercial harvest to dat is 422,000 with a drastic decline in catch per unit of effort during the period on June 30. The Egegik escapement is 158,000 and although an additional 120,000 fish remain in the lagoon below the counting tower, the numbers of fish moving into clear water is declining. Inside and outside test fishing indicates a decline also.

continued

Table 12. (continued)

General Announcements Number	Date	Description
		The commercial harvest in the Ugashik district has been minimal to date and less than 2,000 fish have been counted in the river during a recent aerial survey. This district will probably remain closed through July 17 to secure needed escapements. Faced with a general decline in the abundance of fish in these districts the prospects for additional fishing time are not imminent at this time. We will continue to intensively monitor the situation in all districts for any improvement in the situation. The current opening in the Nushagak district should provide more information on the trend in the red salmon run to Bristol Bay this season.
K 2	July 5	Continuous test fishing over the past four days indicates a significant buildup of fish within the Naknek-Kvichak district and the lower ends of the major rivers above the fishery. An aerial survey of the Kvichak River this afternoon should reveal the actual strength of the escapements. The Naknek River escapements are still lagging behind the level normal for this date but have also begun to increase. If escapement rates continue through this afternoon additional fishing time will be imminent. Outside and inside test fishing continues in the Egegik district and indicates a gradual increase in fish in this district also. Unless passage by the inside boat increases dramatically in the next two tides, fishing time is not imminent. Escapements in the Ugashik district remain insignificant. At this time fishing in this district is not expected before July 17.
K 3	July 6	Escapements into the Naknek River are still lagging behind the rate necessary to attain the goal in this system. Any additional fishing time in the Naknek-Kvichak district in the immediate future may be limited to the Kvichak section only. In the event that this does occur we intend to waiver the 48-hour waiting period for relocation of set nets within the district.

continued

Table 12. (continued)

1/ Emergency order period: Naknek-Kvichak, Egegik and Ugashik districts from 9:00 am June 23 until 9:00 am July 17; Nushagak district from 9:00 am June 16 until 9:00 am July 17.
2/ Letter code on emergency order numbers indicates field office where the announcement originated ("K" is King Salmon and "D" is Dillingham).
3/ Fishing time in the Kvichak section extended until the end of the emergency order period at 9:00 am, July 17. This announcement also provided for a waiver of the 48-hour waiting period normally required of set net fishermen prior to the relocation of their gear to an alternate site. This exception was limited to fishermen located in the Naknek section.
4/ Amended Emergency Order K3 to adjust the timing of the period more in unison with prevailing tide conditions.
5/ Fishing time extended until the end of the emergency order period at 9:00 am, July 17.
6/ Closed to fishing two days beyond the end of the emergency order period.
7/ Closed to fishing. Two day closure followed a 24-hour test opening on July 19-20.
8/ Also restricted further fishing to waters north of the sockeye salmon boundary line.
9/ Closed to fishing beginning 9:00 am, July 25. This emergency order allowed only a 24 hour period on July 24-25.
10/ This emergency order and emergency orders D15 and 16 superceded emergency order D12.

Table 13. Naknek-Kvichak district commercial catch by species and period, 1978.

Date	Time	Effort		Number of Fish					
		Drift	Set	Sockeye	King	Chum	Pink	Coho	Total
6/10	-				17	1			18
6/12-17	5 days			197	343	4			544
6/19-23	4 days			66,901	927	9,158	1		76,987
6/25-26	12 hrs.	15	55	2,411	1	49			2,461
6/27-28	12 hrs.	648	183	750,705	39	7,813			758,557
6/29-30	12 hrs.	650	180	510,460	252	5,625			516,337
7/ 6- 8	2 days, 12 hrs. 1/	770	182	1,943,091	569	42,491			1,986,151
7/ 9-15	7 days 2/	450	189	1,343,077	641	35,428	5		1,379,151
7/16-22	6 days, 9 hrs. 3/	250	175	316,401	894	32,173	7,936		357,404
7/24-29	5 days			43,027	633	24,408	51,638	120	119,826
7/31-8/5	5 days			13,776	148	7,411	547,434	113	568,882
8/ 7-12	5 days			571	12	204	140,658	483	141,928
8/14-19	5 days			26		10	4,627	62	4,725
Totals				4,990,643	4,476	164,775	752,299	778	5,912,971
Percent of District Catch				84.4	0.1	2.8	12.7	+	100.0

1/ Kvichak section only. Naknek section open for 36 hours from 12 noon, July 7 until 12 midnight, July 8.

2/ Kvichak section only. Naknek section open for 13 hours from 12 midnight, July 8 until 1:00 p.m., July 9 and for 24 hours from 5:00 p.m., July 13 until 5:00 p.m., July 14.

3/ Kvichak section only. Naknek section opened at 7:00 a.m., July 17 and resumed regular 5 day-per-week fishing thereafter.

Table 14. Egegik district commercial catch by species and period, 1978.

Date	Time	Effort		Number of Fish					Total
		Drift	Set	Sockeye	King	Chum	Pink	Coho	
6/ 5-10	5 days			359	241	48			648
6/12-17	5 days			4,919	600	318			5,837
6/19-23	4 days	60		124,216	1,297	12,120			137,633
6/24-25	12 hrs.	98	100	27,878	71	2,647			30,596
6/27-28	12 hrs.	203	122	141,675	258	4,526			146,459
6/30	12 hrs.	226	144	58,066	249	3,089			61,404
7/ 7- 8	37 hrs.[1/]	170	124	327,505	28	6,953	6		334,492
7/ 9-15	7 days			442,605	92	18,802			461,499
7/16-22	6 days, 9 hr.			65,713	41	7,834			73,588
7/24-29	5 days			7,404	25	1,761	2,389	43	11,622
7/31-8/5	5 days			2,216	8	194	6,042	595	9,055
8/ 7-12	5 days			123	1	19	1,509	333	1,985
Totals				1,202,679	2,911	58,311	9,946	971	1,274,818
Percent of District Catch				94.3	.2	4.6	.8	.1	100.0

1/ District opened at 11:00 a.m. for 12 hours and extended until regular 5 day-per-week fishing after July 17.

Table 15. Ugashik district commercial catch by species and period, 1978.

Date		Effort		Number of Fish					
		Drift	Set	Sockeye	King	Chum	Pink	Coho	Total
6/ 5-10	5 days				1,315				1,315
6/12-17	5 days				2,955				2,955
6/19-23	4 days			2,107	1,699	560			4,366
7/19-20	24 hrs.[1/]	54	4	5,572	6	683			6,261
7/24-29	5 days			1,337		358	88	1	1,784
7/31-8/5	5 days			1,047	7	52	200	94	1,400
8/ 7-12	5 days			34	1			180	215
8/14-19	5 days			14				490	504
Totals				10,111	5,983	1,653	288	765	18,800
Percent of District Catch				53.8	31.8	8.8	1.5	4.1	100.0

1/ District closed until July 24 at 9:00 a.m. when normal 5 day-per-week fishing resumed.

Table 16. Nushagak district commercial catch by species and period, 1978.

Period	Time	Effort 1/ Drift	Effort 1/ Set	Number of Fish Sockeye	King	Chum	Pink	Coho	Total
5/22-27	5 days				127				127
5/29-6/3	5 days			6	5,278	85			5,369
6/ 5-10	5 days			86	18,483	2,016			20,585
6/12-16	4 days			718	55,542	25,357			81,617
6/20	12 hrs.	250	86	59,593	8,166	140,536	3		208,298
6/23-24	12 hrs.	328	94	67,237	5,973	50,619	4		123,833
6/28	12 hrs.	390	164	545,593	2,787	110,748	5		659,133
7/ 2- 3	24 hrs. 2/	450	164	669,520	2,744	70,349	4		742,617
7/ 4- 8	4½ days	450	164	1,172,928	3,447	143,383	191		1,319,949
7/ 9-16	7 days			579,846	1,227	79,558	10,243	15	670,889
7/17-22	5 days			121,546	1,570	32,898	437,489	383	593,886
7/24-25	24 hrs.	254		12,768	201	4,129	744,703	1,099	762,900
7/27-29	3 days	220	53	6,652	75	2,193	1,201,687	3,289	1,213,896
7/30-8/4	6 days	79	23	3,057	81	1,997	1,635,328	18,848	1,659,311
8/ 5-12	7 days	107	25	66	16	62	321,927	16,142	338,213
8/14-19	5 days			2		1	14,299	5,549	19,851
8/21-26	5 days				1		3,048	381	3,430
8/28-9/2	5 days						3	165	168
Totals				3,239,618	105,718	663,931	4,368,934	45,871	8,424,072
Percent of District Catch				38.5	1.2	7.9	51.9	0.5	100.0

1/ Estimated actual effort based on aerial survey during fishing periods.

2/ Second 12 hours of this period was "Igushik section only".

Table 17. Commercial sockeye catch by period from Clarks Point, Ekuk and Igushik beaches, Nushagak district, Bristol Bay, 1978.

Period	Time	Number of Fish		
		Clarks Point Beach[1/]	Ekuk Beach[2/]	Igushik Beach[3/]
5/29-6/3	5 days			
6/ 5-10	5 days		12	
6/12-16	4 days		197	
6/20	12 hrs.		106	1,653
6/23-24	12 hrs.		1,758	6,893
6/28	12 hrs.	86,838	59,599	18,096
7/ 2- 3	24 hrs.[4/]	25,841	46,687	14,139
7/ 4- 8	4½ days	93,967	88,539	43,182
7/ 9-16	7 days	15,132	45,929	29,625
7/17-22	5 days	14,039	18,078	907
7/24-25	24 hrs.	1,997	1,774	
7/27-29	3 days		2,154	
7/30-8/4	6 days		1,099	
8/ 7	24 hrs.		40	
Totals		237,814	265,972	114,495

1/ Approximate fishing effort was 20 set nets. Sockeye salmon accounted for 67.5% of the total beach catch; catch of other species included 949 kings, 23,094 chums, 90,205 pinks and 11 cohos.

2/ Approximate fishing effort was 100 set nets. Sockeye salmon accounted for 45.5% of the total beach catch; catch of other species included 398 kings, 5,324 chums, 306,771 pinks and 6,229 cohos.

3/ Approximate fishing effort was 24 skiffs and 60 set nets. Sockeye salmon accounted for 96.9% of the total beach catch; catch of other species included 662 kings, 2,316 chums and 721 pinks.

4/ Second 12 hours of this period was "Igushik section only".

Table 18. Togiak district commercial catch by species and period, 1978.

Period	Time[1]	Number of Fish					
		Sockeye	King	Chum	Pink	Coho	Total
6/ 5-10	5 days	305	1,322	139			1,766
6/12-17	5 days	2,141	6,141	1,363			9,645
6/19-24	5 days	10,673	11,230	6,210	9		28,122
6/26-7/1	5 days	57,864	15,569	36,309	412		110,154
7/ 3- 8	5 days	123,051	7,995	66,444	2,645		200,135
7/10-15	6 days[2]	115,055	8,475	73,742	7,193		204,465
7/17-22	6 days[2]	73,085	3,915	63,249	8,943		149,192
7/24-29	6 days[2]	41,661	778	19,264	15,381		77,084
7/31-8/5	5 days	24,339	635	9,495	15,537	74	50,080
8/ 7-12	5 days	3,432	55	745	3,087	449	7,768
8/14-19	5 days	734	22	92	1,053	1,332	3,233
8/21-26	5 days	208	17	113	684	7,970	8,992
8/28-9/2	5 days	37	3	33	203	15,384	15,660
9/ 4- 9	5 days	29		16	14	8,304	8,363
Totals		452,614	56,157	277,214	55,161	33,513	874,659
Percent of District Catch		51.8	6.4	31.7	6.3	3.8	100.0

Summary Catch By Section

Section	Number of Fish					
	Sockeye	King	Chum	Pink	Coho	Total
Togiak	416,844	52,274	262,123	52,427	26,243	809,911
Kulukuk	35,770	3,883	14,088	2,672	5,740	62,153
Osviak			1,003	59	1,276	2,338
Matogak				3	254	257
Totals	452,614	56,157	277,214	55,161	33,513	874,659

1/ Togiak River section open 4 days-per-week, while other sections open 5 days-per-week.
2/ Fishing time in Togiak section extended beyond regular 4 days-per-week.

TABLE 19. Commercial catch by district and species, Bristol Bay, 1978.1/

District and River System	Number of Fish					
	Sockeye	King	Chum	Pink	Coho	Total
NAKNEK-KVICHAK DISTRICT						
Kvichak River	3,562,689					
Branch River	239,551					
Naknek River	1,188,403					
Totals	4,990,643	4,476	164,775	752,299	778	5,912,97
EGEGIK DISTRICT	1,202,679	2,911	58,311	9,946	971	1,274,81
UGASHIK DISTRICT	10,111	5,983	1,653	288	765	18,80
NUSHAGAK DISTRICT						
Wood River	1,759,250					
Igushik River	481,794					
Nuyakuk River	822,649					
Nushagak-Mulchatna	135,942					
Snake River	39,983					
Totals	3,239,618	105,718	663,931	4,368,934	45,871	8,424,07
TOGIAK DISTRICT						
Togiak Section	416,844	52,274	262,123	52,427	26,243	809,911
Kulukak Section	35,770	3,883	14,088	2,672	5,740	62,15
Osviak Section			1,003	59	1,276	2,33
Matogak Section				3	254	25
Totals	452,614	56,157	277,214	55,161	33,513	874,65
Totals	9,895,665	175,245	1,165,884	5,186,628	81,898	16,505,32
Species Percent	60.0	1.1	7.0	31.4	.5	100.0

1/ Preliminary

Table 20. Daily sockeye salmon escapement counts by river system, Bristol Bay, 1978.

	Kvichak River		Naknek River		Egegik River		Ugashik River	
	Daily	Accum.	Daily	Accum.	Daily	Accum.	Daily	Accum.
6/18					408	408		
19					918	1,326		
20					1,824	3,150		
21					966	4,116		
22	162	162			2,718	6,834		
23	312	474	0	0	1,476	8,310		
24	8,652	9,126	252	252	826	9,136		
25	29,118	38,244	90	342	3,438	12,624		
26	22,356	60,600	102	444	5,748	18,372		
27	6,048	66,648	1,194	1,638	5,076	23,448		
28	2,166	68,814	28,758	30,396	10,140	33,588		
29	101,766	170,580	28,920	59,316	11,952	45,540		
30	250,020	420,600	42,678	101,994	47,808	93,348		
7/1	268,620	689,220	13,002	114,996	53,376	146,724		
2	130,782	820,002	4,800	119,796	57,234	203,958		
3	43,548	863,550	10,728	130,524	13,896	217,854		
4	15,420	878,970	55,392	185,916	3,864	221,718		
5	31,872	910,842	147,426	333,342	12,432	234,150		
6	285,312	1,196,154	160,848	494,190	54,210	288,360	168	168
7	611,586	1,807,740	85,320	579,510	124,698	413,058	1,362	1,530
8	702,672	2,510,412	75,930	655,440	177,960	591,018	54	1,584
9	456,054	2,966,466	21,516	676,956	183,300	774,318	1,782	3,366
10	517,146	3,483,612	30,210	707,166	96,762	871,080	3,252	6,618
11	388,590	3,872,202	10,938	718,104	6,810	877,890	1,758	8,376
12	81,756	3,953,958	41,064	759,168	2,496	880,386	8,904	17,280
13	34,674	3,988,632	20,082	779,250	4,284	884,670	7,596	24,876
14	74,112	4,062,744	5,970	785,220	4,632	889,302	4,566	29,442
15	22,788	4,085,532	2,658	787,878	3,012	892,314	10,584	40,026
16	10,170	4,095,702	8,154	796,032	1,938	894,252	13,854	53,880
17	3,948	4,099,650	9,912	805,944	1,446	895,698	7,110	60,990
18	4,332	4,103,982	2,880	808,824			1,548	62,538
19	13,236	4,117,218	2,880	811,704			240	62,778
20	15,606	4,132,824	966	812,670			180	62,958
21	10,236	4,143,060	708	813,378			204	63,162
22	6,228	4,149,288					696	63,858
23							714	64,572
24							426	64,998
25							1,506	66,504
26							876	67,380
27							336	67,716
28							270	67,986
29							1,218	69,204
30							912	70,116
31							318	70,434
8/1								
2								
3								
4								
System Totals		4,149,288		813,378		895,698		70,434

Table 20. (continued)

	Wood River		Igushik River		Snake River		Nuyakuk River		Togiak River	
	Daily	Accum.	Daily	Accum.	Daily	Accum.	Daily	Accum.	Daily	Accum.
6/18										
19	300	300			3	3				
20	918	1,218			2	5				
21	30	1,248			0	5				
22	144	1,392			10	15				
23	6,630	8,022	1,896	1,896	10	25				
24	8,490	16,512	5,142	7,038	0	25				
25	11,334	27,846	4,338	11,376	5	30				
26	5,616	33,462	10,290	21,666	8	38				
27	4,536	37,998	9,948	31,614	2	40			60	60
28	13,626	51,624	9,930	41,544	32	72			510	570
29	167,796	219,420	9,564	51,108	2	74	3,966	3,966	6,930	7,500
30	107,154	326,574	18,978	70,086	44	118	5,520	9,486	8,328	15,828
7/1	108,018	434,592	24,252	94,338	43	161	7,806	17,292	3,126	18,954
2	145,440	580,032	27,222	121,560	73	234	3,768	21,060	3,228	22,182
3	202,716	782,748	24,528	146,088	15	249	20,574	41,634	5,640	27,822
4	433,260	1,216,008	29,076	175,164	200	449	67,746	109,380	8,646	36,468
5	389,172	1,605,180	37,068	212,232	643	1,092	59,658	169,038	14,646	51,114
6	85,020	1,690,200	45,126	257,358	2,242	3,334	47,616	216,654	7,998	59,112
7	100,974	1,791,174	37,788	295,146	2,138	5,472	51,558	268,212	7,260	66,372
8	142,284	1,933,458	46,914	342,060	2,074	7,546	58,512	326,724	5,742	72,114
9	101,328	2,034,786	24,498	366,558	1,290	8,836	64,158	390,882	9,132	81,246
10	67,710	2,102,496	32,280	398,838	838	9,674	43,584	434,466	8,556	89,802
11	33,072	2,135,568	32,484	431,322	917	10,591	48,102	482,568	12,594	102,396
12	28,044	2,163,612	27,564	458,886	1,814	12,405	21,300	503,868	19,602	121,998
13	25,452	2,189,064	28,932	487,818	1,325	13,730	16,812	520,680	19,254	141,252
14	11,838	2,200,902	20,118	507,936	1,339	15,069	14,370	535,050	15,702	156,954
15	7,950	2,208,852	12,222	520,158	531	15,600	12,828	547,878	11,664	168,618
16	4,260	2,213,112	5,826	525,984	285	15,885	8,154	556,032	10,488	179,106
17	9,462	2,222,574	3,426	529,410	80	15,965	5,736	561,768	8,946	188,052
18	19,698	2,242,272	2,178	531,588	283	16,248	2,280	564,048	7,176	195,228
19	6,042	2,248,314	2,064	533,652	102	16,350	3,660	567,708	11,574	206,802
20	5,838	2,254,152	1,854	535,506	97	16,447	1,986	569,694	9,636	216,438
21	5,766	2,259,918	648	536,154	325	16,772	1,386	571,080	8,328	224,766
22	3,504	2,263,422			280	17,052	1,140	572,220	6,072	230,838
23	3,336	2,266,758			178	17,230	960	573,180	3,810	234,648
24	480	2,267,238			120	17,350	840	574,020	2,682	237,330
25					106	17,456	606	574,626	2,724	240,054
26					76	17,532	846	575,472	3,534	243,588
27					57	17,589	282	575,754	4,008	247,596
28					21	17,610	264	576,018	7,272	254,868
29					0	17,610	228	576,246	6,156	261,024
30					38	17,648	282	576,528	3,528	264,552
31					70	17,718	138	576,666	3,282	267,834
8/1					33	17,751			2,250	270,084
2					52	17,803			2,358	272,442
3					271 1/	18,074			972	273,414
4									162	273,576
System Totals		2,267,238		536,154		18,074		576,666		273,576

Table 21. Daily pink salmon escapement tower counts, Nuyakuk River, Bristol Bay, 1978.

Date	Escapement Counts Daily	Escapement Counts Accumulative	Percent Daily	Percent Accumulative
July 14	684	684	.01	.01
15	102	786	.00	.01
16	96	882	.00	.01
17	0	882	.00	.01
18	12	894	.00	.01
19	156	1,050	.00	.01
20	168	1,218	.00	.02
21	558	1,776	.01	.02
22	870	2,646	.01	.04
23	858	3,504	.01	.05
24	1,986	5,490	.03	.08
25	3,438	8,928	.04	.12
26	4,548	13,476	.06	.19
27	5,808	19,284	.08	.27
28	12,918	32,202	.18	.45
29	22,512	54,714	.31	.76
30	43,746	98,460	.61	1.37
31	87,480	185,940	1.22	2.59
Aug. 1	294,054	479,994	4.09	6.68
2	482,658	962,652	6.71	13.39
3	652,410	1,615,062	9.07	22.46
4	641,046	2,256,108	8.92	31.38
5	665,208	2,921,316	9.25	40.63
6	955,752	3,877,068	13.29	53.92
7	780,660	4,657,728	10.86	64.78
8	641,526	5,299,254	8.92	73.70
9	208,152	5,507,406	2.89	76.60
10	68,562	5,575,968	.95	77.55
11	187,152	5,763,120	2.60	80.15
12	262,080	6,025,200	3.64	83.80
13	(-) 28,362	5,996,838	(-) .39	83.40
14	34,380	6,031,218	.48	83.88
15	37,578	6,068,796	.52	84.40
16	113,388	6,182,184	1.58	85.98
17	126,492	6,308,676	1.76	87.74
18	166,068	6,474,744	2.31	90.05
19	178,662	6,653,406	2.48	92.53
20	138,342	6,791,748	1.92	94.46
21	82,794	6,874,542	1.15	95.61
22	93,204	6,967,746	1.30	96.91
23	110,544	7,078,290	1.54	98.44
24	104,466	7,182,756	1.45	99.90
25	7,428	7,190,184	.10	100.00

Summary: 1/	Accumulative	Percent
Tower Enumeration	7,190,184	85.70
Aerial Enumeration	1,200,000	14.30
System Total	8,390,184	100.00

1/ Tower enumeration through termination of counting on Aug. 25. Aerial survey estimate of spawning pink salmon in Nuyakuk River below counting tower on Aug. 25.

Table 22. Summary of salmon aerial survey escapement estimates by species, district and river system, Bristol Bay, 1978.[1/]

District and River System	Number of Fish[2/]									
	Sockeye Salmon		King Salmon		Chum Salmon		Pink Salmon		Coho Salmon	
	Index	Total	Index	Total	Index	Total	Index	Total	Index	Total
NAKNEK-KVICHAK DISTRICT										
Kvichak River	-	-	-	-	-	-	-	440,000	-	-
Branch River	-	229,400	25,100	-	6,350	-	-	736,000	-	-
Naknek River[3/]	-	-	10,650	-	-	-	-	780,000	-	-
Total	-	229,400	35,750	-	6,350	-	-	1,956,000	-	-
EGEGIK DISTRICT										
Egegik River	-	-	-	-	-	-	-	-	-	-
UGASHIK DISTRICT										
Ugashik River	-	-	-	-	-	-	-	-	-	-
Mother Goose	-	12,000	-	-	-	-	-	-	-	-
Total	-	12,000	-	-	-	-	-	-	-	-
NUSHAGAK DISTRICT										
Wood River[4/]	-		30	-	-	-	-	205,000	-	-
Muklung River	1,700		1,170	-	100	-	-	-	-	-
Igushik River	0		110	-	500	-	-	16,000	-	-
Nuyakuk River[5/]	-	87,000	-	-	-	-	-	1,200,000	-	-
Nushagak River[6/]	20,300		23,580	-	40,500	-	-	771,600	-	-
Mulchatna River[7/]	21,500		19,370	-	31,800	-	-	0	-	-
Snake River	200	400	140	-	1,200	-	-	3,400	-	-
Total	43,700	87,400	44,400	130,000	74,100	293,000	-	2,196,000	-	-
TOGIAK DISTRICT										
Togiak River[8/]	17,840	30,600	11,860	-	101,700	203,400	70,000	150,000	-	-
Ungalikthluk River[9/]	1,000	2,000	1,130	-	15,600	31,200	-	-	-	-
Kulukak River[10/]	19,900	33,900	2,720	-	24,200	48,400	-	-	-	-
Quigmy River[11/]	-	-	-	-	9,600	19,200	-	-	-	-
Matogak River	0	0	150	-	15,000	30,000	-	-	-	-
Osviak River	0	0	250	-	17,500	35,000	-	-	-	-
Slug River[12/]	0	0	-	-	7,900	22,200	-	-	-	-
Hagemeister	-	-	-	-	3,400	6,800	-	-	-	-
Total	38,740	66,500	16,110	40,000	194,900	396,200	70,000	150,000	-	-
TOTAL BAY	82,440	395,300	96,260	170,000	275,350	689,200	70,000	4,302,000	-	-

1/ Detailed information on aerial survey derived escapements are published in annual summary reports.
2/ Aerial survey escapement estimates are categorized as: index - indices of total escapement; generally data is incomplete which will not allow determination of total escapement; total - aerial survey data is complete and does allow estimate of total escapement.
3/ Includes Paul's, Big and King Salmon Creek(s).
4/ Includes Ice, Youth and Sunshine Creeks, and Peace and Wind Rivers.
5/ Below the counting tower.
6/ Includes Iowithla, Kokwok, Klutispaw, King Salmon and Chichitnok Rivers, and Klutuk Creek.
7/ Includes Stuyahok, Koktuli, Chichitna and Chilikadrotna Rivers, and Mosquito Creek.
8/ Includes Gechiak and Pungokepuk Creeks and Kashaiak, Narogurum and Ongivinuck Rivers.
9/ Includes Kukayachagak River.
10/ Includes Kulukak Lake and Tithe Creek ponds.
11/ Includes Kurtluk Creek.
12/ Includes Pierce Creek.

TABLE 23. Summary of Kvichak River daily sockeye salmon escapement from tower counts, aerial surveys and inside test fishing, Bristol Bay, 1978. 1/

Date	Enumeration Method: Tower Daily	Tower Cum.	Aerial Survey 2/: Nakeen to Index	Index	Index to Tower	Total River	Inside Test Fishing 3/ Cum.
6/21							(
22	.2	.2					5.8
23	.3	.5					257.5
24	8.6	9.1	136.8	2.0	3.7	142.5	197.6
25	29.1	38.2	+			+ 4/	377.9
6/26	22.4	60.6					377.9
27	6.0	66.6	+	+		+ 4/	438.3
28	2.2	68.8					664.9
29	101.8	170.6	85.5	58.7	14.4	158.6	1,257.9
30	250.0	420.6	180.0	372.5	164.4	716.9	1,773.8
7/1	268.6	689.2	113.9	189.3	120.0	423.2	1,775.4
2	130.8	820.0	48.6	58.2	90.6	197.4	1,751.9
3	43.6	863.6	0	7.4	26.4	33.8	1,579.3
4	15.4	879.0	0.7	3.1	5.4	9.2	1,648.7
5	31.8	910.8	270.0	505.7	36.0	811.7	2,397.1
7/6	285.3	1,196.1	793.4	1,917.8	354.5	3,065.7	3,942.0
7	611.6	1,807.7					4,351.7
8	702.7	2,510.4					4,533.2
9	456.1	2,966.5					
10	517.1	3,483.6					
7/11	388.6	3,872.2					
12	81.8	3,954.0					
13	34.6	3,988.6					
14	74.1	4,062.7					
15	22.8	4,085.5					
7/16	10.2	4,095.7					
17	4.0	4,099.7					
18	4.3	4,104.0					
19	13.2	4,117.2					
20	15.6	4,132.8					
7/21	10.3	4,143.1					
22	6.2	4,149.3					
Season Totals		4,149.3					

1/ All figures expressed in thousands of fish.
2/ Figures represent an average of all survey estimates available for each day.
3/ Determined by multiplying the cummulative index by the historic relationship between escapements and test fish indices at Nakeen. This historic escapement/index relationship is adjusted each day by a factor related to cummulative mean fish weight.
4/ Poor survey conditions.

TABLE 24. Summary of Egegik River daily sockeye salmon escapement from tower counts, aerial surveys and inside test fishing estimates, Bristol Bay, 1978. 1/

Date	Enumeration Method: Tower Daily	Tower Accum.	Aerial 2/ Survey	Inside Test Fishing 3/ Daily	Inside Test Fishing 3/ Accum.	Comments
6/18	.4	.4	.2	.9	1.6	Poor visibility
19	.9	1.3		1.0	2.7	
20	1.8	3.2		.2	2.9	
21	1.0	4.1		.7	3.5	No test fishing
22	2.7	6.8		1.1	4.6	
23	1.5	8.3	3.1	11.7	16.3	Poor visibility
24	.9	9.1	7.6	7.8	24.2	Fair visibility
25	3.4	12.6		11.8	36.0	
26	5.7	18.4		14.2	50.2	
27	5.1	23.4	2.5	23.5	73.7	Poor visibility
28	10.1	33.6	50.0	54.2	127.9	Fair visibility
29	12.0	45.5		79.4	207.2	
30	47.8	93.3	210.4	8.2	215.4	Good visibility
7/ 1	53.4	146.7	186.4	6.5	222.0	Excellent visibility
2	57.2	204.0	32.7	1.6	223.6	Fair visibility
7/ 3	13.9	217.9	15.0	2.4	226.0	Poor visibility
4	3.9	221.7	2.4	7.4	233.3	Good visibility
5	12.4	234.2		22.0	255.3	
6	54.2	288.4	9.4	190.1	445.5	Fair visibility
7	124.7	413.1	72.5	188.4	633.8	Good visibility
7/ 8	178.0	591.0		98.6	732.5	
9	183.3	774.3		3.8	736.3	End of test fishing
10	96.8	871.1				
11	6.8	877.9				
12	2.5	880.4				
7/13	4.3	884.7				
14	4.6	889.3				
15	3.0	892.3				
16	1.9	894.3				
17	1.4	895.7				
Season Totals		895.7			736.3	

1/ All figures in thousands of fish.
2/ Includes estimate of fish in clearwater immediately below the lagoon index areas.
3/ Estimates based on average of escapement/index for previous years (65.4 fish/index point). Linear interpolations made for days not fished.

TABLE 25. Summary of Ugashik River daily sockeye salmon escapement from tower counts, aerial surveys and inside test fishing estimates, Bristol Bay, 1978. 1/

Date	Enumeration Method: Tower Daily	Tower Accum.	Aerial 2/ Survey	Inside Test Fishing Daily	Inside Test Fishing Accum.	Comments
6/21				.4	.4	
22				1.1	1.4	
23				1.4	2.9	
24			0	2.8	5.7	Fair visibility
25				1.7	7.4	
26				3.4	10.8	
27				8.0	18.8	
28			.7	12.5	31.3	Fair visibility
29				15.3	46.5	
30				10.8	57.4	
7/ 1			.7	13.2	70.6	Excellent visibility
2				4.8	75.4	
3				11.7	87.0	
4			0	10.1	97.1	Fair visibility
5				8.5	105.6	
7/ 6	.2	.2	.2	11.1	116.7	Poor visibility
7	1.4	1.5	1.5	14.4	131.1	Poor visibility
8	.1	1.6		67.9	199.0	
9	1.8	3.4		141.2	340.2	
10	3.3	6.6		89.1	429.3	
7/11	1.8	8.4		54.3	483.6	
12	8.9	17.3	1.1	19.3	502.9	Poor visibility
13	7.6	24.9	4.8	67.8	570.7	Good visibility
14	4.6	29.4	21.6	20.5	591.2	Excellent visibility
15	10.6	40.0	25.8	32.0	623.2	Excellent visibility
16	13.9	53.9		13.5	636.7	
17	7.1	61.0		7.0	643.7	
18	1.5	62.5				Very poor visibility
19	.2	62.8				
20-31	7.7	70.4				
Season Totals		70.4			643.7	

1/ All figures in thousands of fish.
2/ Includes total estimates for lagoon index areas and river below lagoon except as otherwise indicated.
3/ Estimates based on average of escapement/index for previous years (34.2 fish/index point). Experimental test fishing.

Table 26. Summary of Wood River daily sockeye salmon escapement from tower counts and aerial survey estimates, Bristol Bay, 1978.[1/]

Date	Enumeration Method: Tower Daily	Tower Accum.	Aerial Survey[2/] Estimate	Comments
6/19	.3	.3		
20	.9	1.2		
21	+	1.2		
22	.1	1.4		
23	6.6	8.0		
24	8.5	16.5		
25	11.3	27.8		
26	5.6	33.5	.3	Good to fair visibility.
27	4.5	38.0	.2	Excellent visibility.
28	13.6	51.6	.8	Poor visibility.
29	167.8	219.4	28.7	Poor vis.; heavy sign in lower river.
30	107.2	326.6	47.0	Poor to fair vis.; min. count.
7/ 1	108.0	434.6	65.0	Fair vis.; fish wandering, est. tot. r. at 100,0
2	145.4	580.0	74.0	Poor visibility.
3	202.7	782.7	115.0	Fair vis.; 8-10 wide in lower river.
4	433.3	1,216.0	-	Very poor vis.; 15 wide; est. tot. r. at 200,00
5	389.2	1,605.2		
6	85.0	1,690.2		
7	101.0	1,791.2		
8	142.3	1,933.5		
9	101.3	2,034.8		
10	67.7	2,102.5		
11	33.1	2,135.6		
12	28.0	2,163.6		
13	25.5	2,189.1		
14	11.8	2,200.9		
15	8.0	2,208.9		
16	4.3	2,213.1		
17	9.5	2,222.6		
18	19.7	2,242.3		
19	6.0	2,248.3		
20	5.8	2,254.2		
21	5.8	2,259.9		
22	3.5	2,263.4		
23	3.3	2,266.8		
24	.5	2,267.2		
Season Total		2,267.2		

1/ All figures in thousands of fish.
2/ Includes estimates of fish in clear water index areas immediately below the counting tower at the time of the survey.

Table 27. Summary of Igushik River daily sockeye salmon escapement from tower counts, aerial survey and inside test fishing estimates, Bristol Bay, 1978.[1/]

Date	Tower		Aerial Surveys[2/]			Inside Test Fishing[3/]	
	Daily	Accum.	Lagoon	River	Total	Daily	Accum.
6/23	1.9	1.9					
24	5.1	7.0	.2	.5	.7	640.4	640.4
25	4.3	11.4				211.8	852.2
26	10.3	21.7	11.0	4.0	15.0	698.2	1,550.4
27	9.9	31.6	9.6	1.4	11.0	354.0	1,904.4
28	9.9	41.5	3.1	1.5	4.6	1,596.0	3,500.4
29	9.6	51.1	1.5	2.7	4.2	1,085.7	4,586.1
30	19.0	70.1	8.0	4.0	12.0	1,221.8	5,807.9
7/ 1	24.3	94.3	12.0	6.0	18.0	1,180.0	6,987.9
2	27.2	121.6	3.0	4.0	7.0	1,269.9	8,257.8
3	24.5	146.1	3.5	2.0	5.5	1,269.9	9,527.7
4	29.1	175.2				1,338.9	10,866.6
5	37.1	212.2				1,338.9	12,205.5
6	45.1	257.4				131.6	12,337.1
7	37.8	295.1				206.5	12,543.6
8	46.9	342.1				203.8	12,747.4
9	24.5	366.6				271.3	13,018.7
10	32.3	398.8				205.7	13,224.4
11	32.5	431.3				68.6	13,293.0
12	27.6	458.9				122.0	13,415.0
13	28.9	487.8					
14	20.1	507.9					
15	12.2	520.2					
16	5.8	526.0					
17	3.4	529.4					
18	2.2	531.6					
19	2.1	533.7					
20	1.9	535.5					
21	.6	536.2					
Season Total		536.2					13,415.0

1/ Tower and aerial survey figures expressed in thousands of fish. Test fishing indices expressed in fish/100 fathom hours.

2/ Includes estimates of fish in clear water index areas immediately below the counting tower at the time of the survey.

3/ Test fishing indices at site B represent an average of all drifts for both tides each day; post season analysis indicates each index point was equal to 40.0 fish.

Table 28. Summary of Nuyakuk River daily pink salmon escapement from tower counts and Nushagak River aerial survey estimates, Bristol Bay, 1978.[1/]

Date	Enumeration Method: Nuyakuk River Tower Count Daily	Nuyakuk River Tower Count Accum.	Nushagak River Aerial Survey[2/] Black Pt. to Port. Cr.	Comments
7/22	.9	2.6		
23	.9	3.5		
24	2.0	5.5	4.0	Poor visibility; est. total river at 100,000.
25	3.4	8.9	0	Poor visibility.
26	4.5	13.5	38.0	Good vis.; minimal count, all in lower river.
27	5.8	19.3	300.0	Exc. vis.; 8 to 40 wide in lower river, min. cou
28	12.9	32.2	500.0	Exc. vis.; 30-40 w. both sides, min. count.
29	22.5	54.7		
30	43.7	98.5	32.0	Good visibility.
31	87.5	185.9		
8/ 1	294.1	480.0		
2	482.7	962.7		
3	652.4	1,615.1		Exc. vis.; 15-50 wide both sides from Portage
4	641.0	2,256.1		Cr. to Nuyakuk tower; 20 to 25,000 fish per
5	665.2	2,921.3		mile, or total of 2-3 million total.
6	955.8	3,877.1		
7	780.7	4,657.7		Exc. vis.; 30-40 wide in upper river, 5-10
8	641.5	5,299.3		wide lower river; est. 2 million total.
9	208.2	5,507.4		
10	68.6	5,576.0		
11	187.2	5,763.1		
12	262.1	6,025.2		
13	(-28.4)	5,996.8		
14	34.4	6,031.2		
15	37.6	6,068.8		
16	113.4	6,182.2		
17	126.5	6,308.7		
18	166.1	6,474.7		
19	178.7	6,653.4		
20	138.3	6,791.7		
21	82.8	6,874.5		
22	93.2	6,967.7		
23	110.5	7,078.3		
24	104.5	7,182.8		
25	7.4	7,190.2		
Season Total		7,190.2		

1/ Tower and aerial survey figures expressed in thousands of fish.
2/ Includes estimates of fish in clear water from Black Point on the Nushagak River to the village of Portage Creek.

Table 29. Summary of Togiak River daily sockeye salmon escapement from tower counts and aerial survey estimates, Bristol Bay, 1978.[1/]

	Tower		Enumeration Method				
			Aerial Surveys[2/]				
Date	Daily	Accum.	Togiak to Pung.	Pungokepuk to Ongi.	Ongivinuck to Tower	Total River	Comments
6/28	.5	.6					
29	6.9	7.5					
30	8.3	15.8	5.2	1.9	1.5	8.6	Poor to fair survey conditions.
7/ 1	3.1	19.0					
2	3.2	22.2					
3	5.6	27.8					
4	8.6	36.5					
5	14.6	51.1					
6	8.0	59.1					
7	7.3	66.4					
8	5.7	72.1					
9	9.1	81.2					
10	8.6	89.8					
11	12.6	102.4					
12	19.6	122.0					
13	19.3	141.3					
14	15.7	157.0					
15	11.7	168.6					
16	10.5	179.1					
17	8.9	188.1					
18	7.2	195.2					
19	11.6	206.8					
20	9.6	216.4					
21	8.3	224.8					
22	6.1	230.8					
23	3.8	234.6					
24	2.7	237.3					
25	2.7	240.1					
26	3.5	243.6					
27	4.0	247.6					
28	7.3	254.9					
29	6.2	261.0					
30	3.5	264.6					
Season Total		273.6					

1/ Tower and aerial survey figures expressed in thousands of fish.
2/ Includes estimates of fish in clear water index areas immediately below the counting tower at the time of the survey.

Table 30. Commercial processors and buyers operating by district, Bristol Bay, 1978.[1/]

Name of Operator	Location	No. of Lines[2/] A	No. of Lines[2/] O	Size	Comments
	NAKNEK-KVICHAK DISTRICT				
(1) Ak. Far East Corp. 250-200 W. Thomas Bldg. Seattle, WA 98119	Naknek	None			Flown out fresh.
(2) Ak. Marine Processors (Unknown)	M/V Kathi R	None			Frozen on M/V Kathi R.
(3) Ak. Packers Ass'n. Box 3326 Bellevue, WA 98009	So. Naknek	3 1	2 1	1 lb. tall ½ lb. flat	Canned and frozen at shore plant and tendered to Seward for canning.
(4) Ak. Marine Prod., Inc. P.O. Box 3417 (ECB) Anchorage, Ak. 99501	M/V Northern King	None			Frozen on M/V Northern King.
(5) Alaska Star, Inc. (DBA Icicle Seafoods) c/o Icicle Seafoods 4215-21st West Seattle, WA 98199	M/V Ak. Star	None			Frozen on M/V Alaska Star.
(6) All Alaskan Seafoods 1818 Westlake Suite 228 Seattle, WA 98109	M/V All Alaskan	None			Frozen on M/V All Alaskan.
(7) B & B Fisheries Box 2367 Kodiak, Ak. 99615	M/V Pacific Harvest	None			Salt cured on M/V Pacific Harvest.
(8) Bumble Bee Seafoods Div. of Castle & Cook Box 60 Astoria, Oregon 97103	So. Naknek	3 2	3 2	1 lb. tall ½ lb. flat	Canned.
(9) H.R.W. Glacier King 720 W. 86th Anchorage, Ak. 99502	M/V Glacier King	None			Frozen on M/V Glacier King.
(10) Kayak Packing Co. 2366 Eastlake Ave. E Seattle, WA 98102	M/V Kayak	None			Flown out fresh.
(11) Kenai Packers, Inc. So. Naknek, Ak. 99670	So. Naknek	None			Tendered to Kenai for canning.

(continued)

Table 30. (continued)

Name of Operator	Location	No. of Lines[2/] A	O	Size	Comments
(12) Kodiak King Crab, Inc. Box 1457 Kodiak, Ak. 99615	N/K	None			Tendered to Dutch Harbor and Kodiak for canning.
(13) Kvichak-Naknek Aquatic Coop. 711 Barrow St. Anchorage, Ak. 99501	M/V Gulf Gypsy and L. McN. & L. 46-44	None			Salt cured on M/V Gulf Gypsy and L. McN. & L. 46-44.
(14) Midgulf Seafoods, Inc. Box 201 Yakutat, Ak. 99689	M/V Lark	None			Frozen on M/V Lark.
(15) Nelbro Packing Co. Box 5299 Univ. Station Seattle, WA 98105	Naknek	1 3	1 3	1 lb. tall ½ lb. flat	Canned and flown out fresh.
(16) New England Fish Co. Pier 89 Seattle, WA 98119	Pedersen Pt. M/V Theresa Lee	None			Frozen at shore plant and on M/V Theresa Lee and flown out fresh.
(17) North Coast Seafood Processors Box 1262 Cordova, Ak. 99574	M/V Polar Bear	None			Frozen on M/V Polar Bear.
(18) No. Peninsula Fisheries 14014 Edgewater Lane, NE Seattle, WA 98125	King Salmon M/V Bobbie	None			Frozen at shore plant and flown out fresh.
(19) Peter Pan Seafoods 1220 Dexter Horton Bldg. Seattle, WA 98104	Naknek	None			Tendered to Dillingham King Cove and False Pass for canning.
(20) Red Salmon Co. Box 5030 Univ. Station Seattle, WA 98105	Naknek	2 2	2 2	1 lb. tall ½ lb. flat	Canned and frozen at shore plant and tendered to Kenai.
(21) Surfline Seafoods Box 262 South Naknek, Ak. 99670	Naknek	None			Cured and flown out fresh.
(22) Whitney-Fidalgo Sea. 2360 W. Commodore Way Box 99008 Seattle, WA 98199	Naknek	2	2	1 lb. tall	Canned, frozen and flown out fresh.

(continued)

Table 30. (continued)

Name of Operator	Location	No. of Lines[2/] A	O	Size	Comments
		EGEGIK DISTRICT			
(1) Ak. Far East Corp.	Naknek	None			Flown out fresh.
(2) Ak. Packers Ass'n.	So. Naknek	None			Frozen at So. Naknek.
(3) Alaska Star, Inc. (DBA Icicle Seafoods)	M/V Ak. Star	None			Frozen on M/V Alaska Star.
(4) Albright, Don Egegik, Ak. 99579	Egegik	None			Flown out fresh.
(5) All Alaskan Seafoods	M/V All Alaskan	None			Frozen on M/V All Alaskan.
(6) Columbia-Wards Fish. P.O. Box 5030 Univ. Station Seattle, WA 98105	M/V Double Star	None			Frozen on M/V Double Star.
(7) Egegik Res. Develop. (DBA Diamond E. Fish.) 1818 Westlake Ave. North #430 Seattle, WA 98109	Egegik	2 1	2 1	1 lb. tall ½ lb. flat	Canned and tendered to Kodiak for canning.
(8) H.R.W. Glacier King	M/V Glacier King	None			Frozen on M/V Glacier King.
(9) Kayak Packing Co.	M/V Kayak	1	1	1 lb. tall	Canned and flown out fresh.
(10) Kodiak King Crab, Inc.	Egegik	None			Tendered to Dutch Harbor and Kodiak for canning.
(11) Nelbro Packing Co.	Naknek	None			Tendered to Naknek for canning.
(12) New England Fish Co.	Egegik	1 1	1 1	1 lb. tall ½ lb. flat	Canned, frozen at Ped. Pt., and tendered to Cordova, Seward and Uganik for canning.
(13) North Coast Seafoods Processors	M/V Polar Bear	None			Frozen on M/V Polar Bear.

(continued)

Table 30. (continued)

Name of Operator	Location	No. of Lines[2/] A	O	Size	Comments
		EGEGIK DISTRICT (continued)			
(14) Queen Fisheries Bldg. C-3 Fishermen's Terminal Seattle, WA 98119	Nushagak	None			Tendered to Nushagak for canning.
(15) Red Salmon Co.	Naknek	None			Tendered to Naknek for canning.
(16) Rieke Enterprises Box 1457 Kodiak, Ak. 99615	M/V Kernel Korn	None			Frozen on M/V Kernel Korn.
(17) Whitney-Fidalgo Seafoods	Naknek	None			Tendered to Naknek for freezing.
		UGASHIK DISTRICT			
(1) Ak. Far East Corp.	Naknek	None			Flown out fresh.
(2) Ak. Packers Ass'n.	Naknek	None			Tendered to Naknek for canning.
(3) Briggs-Way Co. Ugashik, Ak. 99683	Ugashik	1	1	½ lb. jar	Custom canned in Ugashik.
(4) Egegik Resources Devel.	Egegik	None			Tendered to Egegik for canning.
(5) Engstrom Brothers Box 723 Juneau, Ak.	Dillingham	None			Tendered to Dillingham for freezing.
(6) Griechen Fish Co. Box 496 Pilot Point, Ak. 99649	Pilot Pt.	None			Salt cured and flown out fresh.
(7) Hansen, Walter A. Box 104 Pilot Point, Ak. 99649	Pilot Pt.	None			Flown out fresh.
(8) No. Coast Seafood Proc.	M/V Polar Bear	None			Frozen on M/V Polar Bear.
(9) Whitney-Fidalgo Seafoods	Naknek	None			Tendered to Naknek for freezing.

(continued)

Table 30. (continued)

Name of Operator	Location	No. of Lines[2/] A	O	Size	Comments
	NUSHAGAK DISTRICT				
(1) Ak. Far East Corp.	Naknek M/V McCloud	None			Tendered to Naknek an' flown out fresh.
(2) Ak. Marine Processors	M/V Kathi R.	None			Frozen on M/V Kathi R.
(3) Ak. Marine Products, Inc.	M/V Northern King & Dolphin	None			Frozen on M/V Norther.. King and Dolphin.
(4) Ak. Packers Ass'n.	Clarks Pt.	None			Tendered to Naknek an Seward for canning.
(5) Alaska Star, Inc. (DBA Icicle Seafoods)	M/V Ak. Star	None			Frozen on M/V Ak. Star and flown out fresh.
(6) Ak. Woods Transportation 1410 W. 36th Ave., Apt. #1 Anchorage, Ak. 99503	Clarks Point	None			Flown out fresh.
(7) B & B Fisheries	M/V Ptarmigan	None			Frozen on M/V Ptarmigan.
(8) Ball Brothers 3343 W. 80th Anchorage ,Ak. 99502	Dillingham	None			Flown out fresh.
(9) Columbia-Wards Fish.	Ekuk M/V Double Star	3 1	3 1	1 lb. tall ½ lb. flat	Canned, frozen on M/V Double Star and tendered to Alitak for canning.
(10) Egegik Resources Devel.	Egegik	None			Tendered to Egegik for canning.
(11) Engstrom Brothers	Dillingham	None			Frozen at shore plant.
(12) Kodiak King Crab	Nushagak	None			Tendered to Kodiak and Dutch Harbor for canning.
(13) Morpac, Inc. 4215-21st Ave. W. Seattle, WA 98199	Dillingham	None			Flown out fresh.
(14) N & N Market Box 23 Dillingham, Ak. 99576	Dillingham	None			Fresh wholesale market.

(continued)

Table 30. (continued)

Name of Operator	Location	No. of Lines[2/] A	O.	Size	Comments
	NUSHAGAK DISTRICT (continued)				
(15) New England Fish Co.	Nushagak	None			Tendered to Uganik for canning.
(16) Peter Pan Seafoods	Dillingham	2	2	1 lb. tall	Canned, flown out fresh and tendered to False Pass for canning.
		2	2	½ lb. flat	
(17) Queen Fisheries	Nushagak	1	1	1 lb. tall	Canned, flown out fresh and tendered to Kodiak for canning.
		2	2	½ lb. flat	
		1	1	¼ lb. flat	
(18) Rieke Enterprises	M/V Kernel Korn	None			Frozen on M/V Kernel Korn.
(19) Whitney-Fidalgo Seafoods	Naknek	None			Tendered to Naknek for freezing.
	TOGIAK DISTRICT				
(A) SALMON					
(1) Ak. Farm-N-Sea 6511 Arctic Spur Rd. Anchorage, Ak. 99502	Togiak	None			Flown out fresh.
(2) Ak. Marine Products	M/V Northern King & Dolphin	None			Frozen on M/V Dolphin and Northern King.
(3) All Alaskan Seafoods	M/V All Alaskan	None			Frozen on M/V All Alaskan.
(4) Anchorage Seafoods Box 89017 Anchorage, Ak. 99508	Togiak	None			Flown out fresh.
(5) Ball Brothers	Dillingham	None			Flown out fresh.
(6) Columbia-Wards Fish.	Ekuk	None			Tendered to Ekuk for canning.
(7) Engstrom Brothers	Dillingham	None			Tendered to Dillingham for freezing.
(8) Kachemak Seafoods Box 129 Togiak, Ak. 99678	Togiak	None			Flown out fresh.

(continued)

Table 30. (continued)

Name of Operator	Location	No. of Lines[2/] A	O	Size	Comments
	TOGIAK DISTRICT (continued)				
(A) SALMON (continued)					
(9) Olympic Fish Products, Inc. 33613 9th Ave. S Federal Way, WA 98003	M/V Teddy	None			Frozen on M/V Teddy
(10) Peter Pan Seafoods	Dillingham	None			Tendered to Dillingha for canning.
(11) Queen Fisheries, Inc.	Nushagak	None			Tendered to Nushagak for canning.
(12) Togiak Fisheries, Inc. 2366 Eastlake Ave. E. Suite 302 Seattle, WA 98102	Togiak	1 1	1 1	1 lb. tall ½ lb. flat	Canned and frozen at plant.
(B) HERRING					
(1) Alaska Star, Inc. (DBA Icicle Seafoods)	M/V Alaska Star M/V Marin I and Glacier	None			Frozen on M/V Ak. Star and salted on M/V Marin I and Glacier.
(2) Aldrich, Jack Box 8 Petersburg, Ak. 99833	Togiak	None			Salted.
(3) All Alaskan Seafoods	M/V All Alaskan	None			Frozen on M/V All Alaskan.
(4) B & B Fisheries	Togiak	None			Tendered to Kodiak.
(5) Columbia-Wards Fish.	Ekuk	None			Tendered to Ekuk for freezing and salted on grounds for export to Japan.
(6) Engstrom Brothers	Dillingham	None			Tendered to Dillingham for freezing.
(7) Hakala, Michael M. Box 58 Naknek, Ak. 99633	M/V Julie Kay	None			Salted on M/V Julie Kay.

(continued)

Table 30. (continued)

Name of Operator	Location	No. of Lines[2/] A O Size	Comments
	TOGIAK DISTRICT (continued)		
(B) HERRING (continued)			
(8) Kodiak King Crab	Togiak	None	Tendered to Kodiak.
(9) Kvi.-Nak. Aquatic Coop.	L. McN & L 46-44	None	Salted on L. McN & L 46-44.
(10) Newby, Richard 2510 Aspen Drive Anchorage, Ak. 99503	M/V Grampus	None	Salted on M/V Grampus.
(11) Pacific Pearl Seafoods 1450 114th Ave. S.E. Bellevue, WA 98004	M/V Pacific Pearl	None	Frozen on M/V Pacific Pearl and tendered to Kodiak.
(12) Petersbury Fisheries (DBA Icicle Seafoods)	Togiak	None	Tendered to Seward.
(13) Seward Marine Services Box 335 Seward, Ak. 99664	Togiak	None	Tendered to Seward.
(14) Sorensen's Lighterage Co. Box 173 Dillingham, Ak. 99576	M/V Starling S and Snooks	None	Salted on M/V Starling S and Snooks.
(15) Togiak Fisheries, Inc.	Togiak	None	Frozen at shore plant.
(16) Whitney-Fidalgo Seafoods	Togiak	None	Frozen.
(C) HERRING ROE-ON-KELP			
(1) Ak. Far East Coop.	Naknek	None	Salted.
(2) Anderson, Emil A. Box 13 Naknek, Ak. 99633	M/V Maree	None	Salted on M/V Maree.
(3) Hakala, Michael M.	M/V Julie Kay	None	Salted on M/V Julie Kay.
(4) Hansen, Paul J. Box 82 Naknek, Ak. 99633	M/V Cutbank Queen	None	Salted on M/V Cutbank Queen.
(5) Ivanoff, Alfred Naknek, Ak. 99633	M/V Good Hope	None	Salted on M/V Good Hope.

(continued)

Table 30. (continued)

Name of Operator	Location	No. of Lines[2/] A	No. of Lines[2/] O	Size	Comments
		TOGIAK DISTRICT (continued)			
(C) HERRING ROE-ON-KELP (continued)					
(6) Kvi.-Nak. Aquatic Coop.	L. McN. and L. 46-44	None			Salted on tender.
(7) Lont, John 14823 12th Ave. N.E. Seattle, WA 98155	M/V Sea Deuce	None			Salted on M/V Sea Deuce.
(8) Moorcroft, Morry Box 316 King Salmon, Ak. 99613	M/V Le-La	None			Salted on M/V Le-La.
(9) Newby, Richard	M/V Grampus	None			Salted on M/V Grampus
(10) Sorensen's Lighterage Co.	M/V Starling S and Snooks	None			Salted on M/V Starling S and Snooks
(11) Togiak Fisheries, Inc.	Togiak	None			Salted at shore plant.

(continued)

Table 30. (continued)

FISHERY OPERATOR SUMMARY

District	Number of Operators (Total)	Export Fresh	Export Brine	Frozen	Cured	Canned	Number Canning Lines 2/ 1 lb. tall A	1 lb. tall O	½ lb. flat A	½ lb. flat O	¼ lb. flat A	¼ lb. flat O
(A) SALMON												
Naknek-Kvichak	(22)	7	5	12	3	5	11	10	8	8	-	-
Egegik	(17)	3	6	9	-	3	3	3	2	2	-	-
Ugashik	(9)	3	2	3	1	1	-	-	-	-	1	1
East Side	(31)	(10)	(9)	(15)	(4)	9	14	13	10	10	1	1
Nushagak	(19)	8	7	8	-	3	6	6	5	5	1	1
Togiak	(12)	4	3	5	-	1	1	1	1	1	-	-
West Side	(25)	(11)	(7)	(11)	-	4	7	7	6	6	1	1
Total Bay	(40)	19	10	19	4	13	21	20	16	16	2	2
(B) HERRING												
Togiak	(16)	-	5	7	7	-	-	-	-	-	-	-
(C) HERRING ROE-ON-KELP												
Togiak	(11)	-	-	-	11	-	-	-	-	-	-	-

1/ Indicates operators with either a physical plant or processing facility in a district or those operators from other areas buying fish and/or providing tender service for fishermen in districts away from the processing facility.

2/ A - indicates the number of canning lines available for operation; O - indicates the number of canning lines actually operated.

Table 31. Salmon case pack and commercial production of frozen and cured salmon by species, Bristol Bay, 1978.[1/]

Category	No. Operators	Pack and Production[2/] Sockeye	King	Chum	Pink	Coho	Total
(A) CASE PACK (in 48 - 1 lb. talls)							
East Side	9	331,029	3,082	22,941	38,425	269	395,746
West Side	4	220,619	3,900	53,985	124,805	2,647	405,956
Total	13	551,648	6,982	76,926	163,230	2,916	801,702
(B) FROZEN (in pounds)							
East Side	15	4,227,209	233,334	159,618	1,023,489	5,660	5,649,310
West Side	13	2,079,452	1,615,617	601,411	556,747	139,695	4,992,922
Total	20	6,306,661	1,848,951	761,029	1,580,236	145,355	10,642,232
(C) CURED (in pounds)							
East Side	3	680,402	4,664	17,388	97,390	3,410	803,254
West Side	0	0	0	0	0	0	0
Total	3	680,402	4,664	17,388	97,390	3,410	803,254
(D) TOTAL FROZEN AND CURED (in pounds)							
East Side	17	4,907,611	237,998	177,006	1,120,879	9,070	6,452,564
West Side	13	2,079,452	1,615,617	601,411	556,747	139,695	4,992,922
Total	22	6,987,063	1,853,615	778,417	1,677,626	148,765	11,445,486

1/ Includes only fish processed in Bristol Bay; east side includes Naknek-Kvichak, Egegik and Ugashik districts, while west side includes Nushagak and Togiak districts.

2/ Pack and production data extracted primarily from "Final Operations Reports" (BB-CF/303), and from catch and production reports or fish tickets in unavailable in final report form.

Table 32. Salmon transported out of the area for processing, by species, Bristol Bay, 1978.[1/]

Category	No. Operators	Fresh/Brine Export Sockeye	King	Chum	Pink	Coho	Total
(A) FRESH EXPORT BY AIR[2/] (in pounds)							
East Side	10	3,373,908	65,125	70,198	1,772,729	8,254	5,290,214
West Side	9	1,775,519	1,483,314	914,210	194,691	332,958	4,700,692
Total	18	5,149,427	1,548,439	984,408	1,967,420	341,212	9,990,906
(B) BRINE EXPORT BY SEA[2/3/] (in number of fish and pounds)							
East Side:	7						
No. Tenders[4/]							27
No. Fish							1,313,869
Pounds							7,458,666
West Side:	5						
No. Tenders[4/]							6
No. Fish							288,355
Pounds							1,845,710
Total:	9						
No. Tenders[4/]							33
No. Fish							1,602,224
Pounds							9,304,376

1/ Includes all fish exported from Bristol Bay in either brine or chilled sea water by sea-going tenders, or by air transportation; east side includes Naknek-Kvichak, Egegik and Ugashik districts, while west side includes Nushagak and Togiak districts.

2/ Export information extracted primarily from "Final Operations Reports" (BB-CF/303), and from catch and production reports or fish tickets if unavailable in final report form; some processors reported mixed reds and chums.

3/ Specie breakdown generally not available until fish are final processed.

4/ Number of tenders are estimated.

Table 33. Average round weight and value of the commercial catch, by species and district, Bristol Bay, 1978.

I. WEIGHT

District	Average Round Weight in Pounds[1] Sockeye	King	Chum	Pink	Coho	Total
Naknek-Kvichak	5.50	28.32	6.58	3.59	6.38	
Egegik	6.31	23.64	6.70	3.20	6.25	
Ugashik	6.20	29.20	6.20	3.30	-	
Nushagak	6.29	22.34	7.08	3.11	6.79	
Togiak	7.32	26.10	8.05	3.77	8.19	
Weighted Average	5.93	23.91	7.21	3.19	7.45	
Total Weight of Catch, All Districts[2]	58,874	4,580	8,350	16,437	702	88,943

II. VALUE

Category	Estimated Value Sockeye	King	Chum	Pink	Coho	Total
Average Price Per Pound[3]	$ .68	$ .70	$ .38	$ .33	$ .62	
Average Price Per Fish	$ 4.03	$16.74	$ 2.74	$ 1.05	$4.62	
Ex-Vessel Value to Fishermen[2]	$40,034	$3,206	$3,173	$5,424	$435	$52,273

1/ Data extracted from "Bristol Bay Final Operations Report" (BB-CF/303), and "Bristol Bay Salmon Catch Reports" (BB-CF/301), and is weighted by the catch of each processor.

2/ Total weight and ex-vessel value shown in thousands of pounds and dollars, respectively.

3/ Average price per pound derived from AIFMA and WACMA price schedules; Sockeye and Pink - average of AIFMA and WACMA, King - WACMA fresh/frozen, Chum and Coho - WACMA.

Table 34. Subsistence salmon catch by species, district and village area, Bristol Bay, 1978.

Area	Permits Issued	Number of Fish[1/]					
		Sockeye	King	Chum	Pink	Coho	Total
NAKNEK-KVICHAK DISTRICT:							
Naknek system[2/]	219	9,200	1,000	300	1,000	200	11,800
Kvichak system:							
Levelock	27	8,900	100	100	200	100	9,400
Igiugig	29	8,800	+	500	300	+	9,600
Kokhanok	19	23,700		+	+		23,800
Pedro Bay	19	11,200					11,200
Port Alsworth	20	3,000				+	3,000
Nondalton	29	17,300					17,300
Newhalen	6	6,100					6,100
Iliamna	24	4,900	+	+			4,900
District Total	392	93,100	1,200	1,000	1,400	300	97,000
EGEGIK DISTRICT							
Egegik system[3/]	13	200	+	100		200	500
UGASHIK DISTRICT							
Ugashik system[4/]	8	500	100	100	+	900	1,500
NUSHAGAK DISTRICT							
Nushagak Bay[5/]	197	11,200	2,200	1,300	4,500	1,200	20,300
Wood system[6/]	15	2,300	+	100	300	+	2,600
Igushik system							
Manokotak	26	2,100	100	+	300	700	3,200
Nushagak system							
Portage Creek	8	1,900	500	2,500	2,200	200	7,300
Ekwok	14	6,500	1,000	3,000	2,400	+	12,900
New Stuyahok	38	5,900	2,300	4,700	1,100	200	14,200
Koliganek	11	3,300	500	2,700	300	200	6,800
District Total	331	33,000	6,500	14,300	11,000	2,500	67,300
TOGIAK DISTRICT							
Togiak system[7/]	29	900	300	700	300	500	2,700
TOTAL BRISTOL BAY	773	127,600	8,100	16,200	12,700	4,400	169,000

1/ Catches rounded to nearest 100 fish, and totals may not equal the sum of the district catches.
2/ Includes the communities of Naknek, South Naknek and King Salmon.
3/ Includes the villages of Egegik and North Egegik.
4/ Includes the villages of Pilot Point and Ugashik.
5/ Includes the communities of Dillingham, Kanakanak, Clarks Point, Clarks Slough (Queen), Ekuk; Igushik Beach and the Lewis Point fish camps.
6/ Includes the village of Aleknagik.
7/ Includes the villages of Togiak and Twin Hills.

District of Bristol Bay, 1978,

)-11.0 / :ogak	Biomass Estimates[2/] W/O 25% Error low	W/O 25% Error high	W/25% Error low	W/25% Error high
	5,393	8,855	4,044	6,641
	582	957	436	717
0	19,811	32,527	14,858	24,395
	6,268	10,319	4,701	7,739
785	34,190	61,411	25,642	46,058
	6,529	13,034	4,896	9,775
801	230,171	411,030	172,628	308,272
	25,462	44,511	19,096	33,383
	211	589	158	411

Table 36. Inshore commercial herring catch by day and gear type, Togiak district, Bristol Bay, 1978.

Date	Catch in Pounds: Gill Net Daily	Gill Net Accum.	Purse Seine Daily	Purse Seine Accum.	Total Daily	Total Accum.	Metric Tons Daily	Metric Tons Accum. 1/
5/11	0	0	30,277	30,277	30,277	30,277	14	14
12	0	0	142,346	172,623	142,346	172,623	65	79
13	17,370	17,370	90,546	263,169	107,916	280,539	49	128
14	5,740	23,110	242,930	506,099	248,670	529,209	113	241
15	0	23,110	6,000	512,099	6,000	535,209	3	244
16	15,030	38,140	658,661	1,170,760	673,691	1,208,900	306	550
17	47,872	86,012	2,263,161	3,433,921	2,311,033	3,519,933	1,049	1,599
18	151,534	237,546	2,191,908	5,625,829	2,343,442	5,863,375	1,063	2,662
19	35,491	273,037	554,650	6,180,479	590,141	6,453,516	268	2,930
20	9,124	282,161	424,700	6,605,179	433,824	6,887,340	197	3,127
21	5,128	287,289	1,190,995	7,796,174	1,196,123	8,083,463	543	3,670
22	74,566	361,855	414,938	8,211,112	489,504	8,572,967	222	3,892
23	2,000	363,855	201,191	8,412,303	203,191	8,776,158	92	3,984
24	285,884	649,739	3,316,240	11,728,543	3,602,124	12,378,282	1,634	5,618
25	266,209	915,948	400,808	12,129,351	667,017	13,045,299	303	5,921
26	168,399	1,084,347	299,896	12,429,247	468,295	13,513,594	212	6,133
27	113,133	1,197,480	87,820	12,517,067	200,953	13,714,547	91	6,224
28	41,519	1,238,999	383,177	12,900,244	424,696	14,139,243	193	6,417
29	72,827	1,311,826	358,250	13,258,494	431,077	14,570,320	196	6,613
30	51,923	1,363,749	778,236	14,036,730	830,159	15,400,479	377	6,990
31	1,175	1,364,924	30,000	14,066,730	31,175	15,431,654	14	7,004
6/ 1	0	1,364,924	70,325	14,137,055	70,325	15,501,979	32	7,036
Totals		1,364,924		14,137,055		15,501,979		7,033
Percent of Catch		8.8		91.2		100.0		

1/ Due to rounding of daily catches, the total catch may not equal the sum of the daily catches.

Table 37. Commercial herring roe-on-kelp harvest by day, Togiak district, Bristol Bay, 1978.

Date	Harvest in Pounds		Metric Tons	
	Daily	Accum.	Daily	Accum. 1/
5/13	3,111	3,111	1	1
14	18,478	21,589	8	9
15	33,762	55,351	15	24
16	19,627	74,978	9	33
17	39,299	114,277	18	51
18	53,048	167,325	24	75
19	30,815	198,140	14	89
20	5,841	203,981	3	92
21	12,267	216,248	6	98
22	10,582	226,830	5	103
23	0	226,830	0	103
24	0	226,830	0	103
25	12,854	239,684	6	109
26	44,520	284,204	20	129
27	3,869	288,073	2	131
28	0	288,073	0	131
29	8,985	297,058	4	135
30	160	297,218		135
31	0	297,218	0	135
6/ 1	6,475	303,693	3	138
2	16,065	319,758	7	145
3	10,100	329,858	5	150
Total	329,858		150	

1/ Due to rounding of daily harvests, the total harvest may not equal the sum of the daily harvests.

APPENDIX

1978 MANAGEMENT OUTLOOK
BRISTOL BAY COMMERCIAL SALMON FISHERY

The Alaska Department of Fish and Game pre-season forecast of the 1978 Bristol Bay sockeye salmon run projects a total run of 11.5 million fish. Table 1 outlines the sockeye forecast, escapement goals and projected harvests by system. For the first year since 1971 the run is expected to exceed the average total run for similar mid-cycle years (7.6 million). The anticipated inshore harvest of 6.3 million fish would be above the average non-peak harvest of around 5 million. Sockeye returns to all major systems will be composed of predominantly 4, 5 and 6 year old fish from spawning escapements in 1974, 1973 and 1972, respectively. Almost 58% of the fish are expected to be 4 year fish from the 1974 brood year. The above average Kvichak River run has been anticipated and planned for since the Department adopted the Kvichak River escapement management plan in 1969. The plan requires increased escapements in pre-peak as well as peak cycle years with the objective of spreading sockeye salmon production over several years in the system's 5 year cycle. The strong run to the Kvichak this season is primarily the result of the 4.4 million escapement obtained in 1974 (pre-peak cycle year). Based on past Kvichak system data a large portion of the return will be 4 year old fish. Similarly, the run to the Wood River system will also be dominated by fish from the 1974 escapement of 1.7 million. The smallest recorded run to Bristol Bay in the history of the fishery occurred in 1973 and due to the poor escapements secured in that year the 1978 return is not expected to produce many 5 year fish.

The combined sockeye escapement goals for all eleven of the major river systems in Bristol Bay total 5.5 million which continues to be the standard "off-year" escapement requirement in the three years following the peak cycle year (1975). The Kvichak River maintenance level escapement goal of 2 million takes into consideration that minimal production (return per spawner) has been realized from this year in the cycle from escapements above this level.

Significant harvests are projected for all of the Bay's commercial fishing districts with the exception of the Ugashik district which for the second consecutive year is expected to produce a run below the escapement goal. The estimates of allowable harvests by district in descending order of magnitude are: Naknek-Kvichak with 4.1 million, Nushagak with 1.2 million, Egegik with 900 thousand, and Togiak with 200 thousand.

The prime management objectives will be to obtain escapement goals while allowing the harvest of those fish in excess of the escapement requirements. An effort will be made to distribute the allowable harvest throughout the season as well as fishing pressure and run timing will permit. With a harvestable surplus forecasted in most of the major districts a more even distribution of fishing effort is anticipated this season. Early season "testing" of run strength utilizing the commercial fleet will be likely in a couple districts and will remain an option in the others with the exception of the Ugashik district where severe restrictions will be necessary if escapements are to be protected.

Ultimate fishing time permitted in the various districts will depend on the strength of the run and the available fishing effort. Indications from early season catches along with a comprehensive program of offshore and inshore test fishing, aerial surveys and escapement counts will provide advance information on run strength to regulate fishing time.

Management goals will also be directed at achieving adequate escapements of other species of salmon in several districts. King salmon returns in the Nushagak and Togiak districts are not expected to surpass the large catches of last year however they should be better than recent low years and well above the long term average. Depending on run strength, timing and the amount of fishing effort in the Nushagak district this fishery may require special management considerations. Average escapements of chum salmon in 1974 should produce a run in 1978 that is on par with the long term average for this species. The 1976 escapement of pink salmon was well distributed and optimum numbers were observed in most spawning systems. Weather during the intervening two years has been mild and survival conditions should have been optimum. The harvest of pinks in 1978 is expected to be considerably above the long term average for this species. Some special management considerations may be required in the Nushagak district in order to secure optimum escapement requirements in the important spawning areas of the Nuyakuk River.

Depending on the amount of late season processing capacity and fishing effort the coho salmon harvest could approach a level almost double the long term average for this species.

The general management outlook for sockeye salmon in the various districts in Bristol Bay is as follows:

Naknek-Kvichak District

With sizeable commercial harvests forecasted for both major systems in this district, fishery managers should have considerable latitude during early stages of run development in 1978. Although the escapement requirements for the Kvichak and Naknek Rivers are much different, the rate of exploitation for both systems should be comparable and concurrent fishing time is anticipated for both sections this season. Ultimate management strategy for the respective stocks will depend on the distribution and size of the available fishing effort. Run development and buildup of escapement will be monitored closely in both rivers. A combination of commercial catch analysis, outside and inside test fishing, aerial surveys of the rivers and tower escapement counts should provide timely assessment of the runs as they develop. Fishing time will be allowed in accordance with run development trends in the various rivers.

Egegik District

The run to this district is expected to be in excess of escapement requirements and a season catch approaching the long-term average is anticipated. Actual fishing time will depend on the amount of available fishing effort, run timing and indicated magnitude of the run.

Ugashik District

The expected return of sockeye salmon to the Ugashik district is only half the escapement needs for this system. No fishing time is anticipated during the emergency order period. Run development will be continually and closely monitored and should the run be stronger than anticipated, fishing time will be allowed when the escapement goal is assured.

Nushagak District

In this district, which has five contributing river systems, all but Snake River are anticipated to produce well enough to permit harvests in excess of

escapement requirements. With a forecasted surplus to both the Wood and Igushik Rivers early season fishing is anticipated for both sections in 1978. If the run develops as forecasted no Igushik only openings concurrent with extensive closures of the Nushagak are anticipated this season. Run development will be monitored extensively and fishing time will be allowed as catch and escapement trends dictate. Availability and distribution of fishing effort along with developing run strength will bear heavily on the ultimate number and length of fishing periods permitted in this district.

Early fishing on Nushagak king salmon stocks will also help indicate run strength and determine the fishing schedule during the early part of the emergency order period which begins on June 16 in this district.

Togiak District

The forecasted sockeye run to this district is in excess of escapement requirements and the projected harvest should exceed the long-term average. Available fishing effort compared with that encountered in recent years and actual run strength will have considerable bearing on the amount of fishing time allowed.

APPENDIX B

BRISTOL BAY PROCESSING CAPACITY, 1978

EXISTING PROCESSING CAPABILITIES

The analysis of existing processing capabilities for Bristol Bay has been approached by computing separately the capacities for the east (Naknek-Kvichak, Egegik and Ugashik districts) and west (Nushagak and Togiak districts) sides. The primary reason for this approach is that while a great deal of processing of west side salmon (primarily Nushagak district fish) occurs on the east side, the west side operations continue longer as a result of the Nushagak district pink salmon run which occurs after the sockeye salmon run.

WEST SIDE (Nushagak and Togiak Districts)

Canning Capacity. An inventory of canning lines on the west side of Bristol Bay indicates a total of 14 lines, consisting of 7-1 lb. lines, 6-1/2 lb. lines, and 1-1/4 lb. line (Table 30). In the absence of estimates of actual plant capacities by the operators themselves, the canning capacity has been estimated by multiplying the average capacity of a single 1 lb. line by the total number of one pound lines available. This approach assumes that the smaller can size lines would be shut down during the peak harvest period. Using this technique, the west side capacity is estimated at 21,000 cases per day or approximately 273,000 fish per day using a 13 fish per case conversion factor. Obviously canning is not limited to only the 1 lb. lines throughout the season. When harvest rates permit processors switch operations to the other lines with less daily capacity. Therefore, to estimate the total season maximum potential canning capacity, the normal processing period (mid-June through early August) was divided into three periods (early, middle and late) with 30% of maximum efficiency applied to the early and late periods and 70% maximum efficiency applied to the middle period. Using this technique an estimated 7.8 million salmon could be canned during the season. This analysis assumes that canning operations continue on a daily basis throughout the season. However, the characteristics of the fishery are such that continuous operations are not commonly possible as district openings occur at intervals and fish are not available on a continuous basis. Therefore an analysis of short term canning capacity may be more appropriate. The estimate of short term canning capacity for west side facilities has been derived by applying a 90% efficiency factor to the maximum capacity for three days. Three days being the maximum time period commonly required to process fish caught in a 12-24 hour period during the peak of the season. The capacity estimated for short term operation is 737,000 salmon. This estimate is in part dependent on the brine holding capacity on hand to protect the surplus from spoilage. That capacity (brine) is estimated at 500,000 salmon. Additional brine capacity is available from east side operations and is normally used extensively.

Export and Fresh/Frozen Capacity. West side seasonal export capacity in fresh/frozen products is estimated at 150,000 salmon. This estimate is based on 1977 season totals plus anticipated operational expansions.

Combined Capacity. The combined capacity for west side operations is best estimated by considering the short term canning rate rather than the unrealistically high estimate of the seasonal potential canning capacity. By using the short term capacity of 737,000 at a rate of one per week for 7 weeks,

a total of 5.2 million fish could more realistically be canned through the season. With the addition of 200,000 export capacity an estimated 5.4 million appears to be the seasonal capacity for the west side of Bristol Bay.

EAST SIDE (Naknek-Kvichak, Egegik and Ugashik Districts)

Canning Capacity. The east side facilities possess a total of 25 canning lines consisting of 14-1 lb. lines, 10-1/2 lb. lines and 1-1/4 lb. line (Table 30). The maximum daily capacity, estimated from the capacity of the 1 lb. lines, projects a daily potential of 624,000 salmon.

By following the same technique used earlier for separating the normal canning season into three periods and applying 70% efficiency factor for the middle period and 30% efficiency factor to the early and late periods an estimated 9.4 million salmon could be put up between June 19 and July 21, a 33 day period.

The short term canning capacity for east side operations is estimated at 1.7 million salmon per three-day period. This estimate is derived by applying a 90% efficiency factor to the maximum potential capacity of all 1 lb. lines for the three day period. As noted before the short term capacity is partly dependent on the availability of brine holding capacity to protect the surplus from spoilage. The east side brine capacity, estimated at about 1.5 million salmon, is adequate to cover the short term canning capacity of 1.7 million salmon. A large segment of a period's catch is usually canned fresh which substantially reduces the required brine holding capacity.

Export and Fresh/Frozen Capacity. Most of the large processors have the potential for exporting fish out of the Bristol Bay area for processing, however, only two processors commonly do it. The majority of the processors do not ship out fish unless they get into trouble during the season. The estimate for export is 850,000 fish with a range up to 2 million.

The fresh/frozen season capacity of east side operators is estimated at 1.5 million salmon. This estimate is derived from the capacity of one shore based operation and four floating operations with an anticipated expansion for 1978.

Combined Processing Capacity. The combined processing capacity of 11.8 million salmon has been derived by adding the estimated total season canning capacity of 9.4 million to the .9 million export capacity and the 1.5 million fresh/frozen capacity.

TOTAL BRISTOL BAY

Processing Capacity. The seasonal total canning capacity of all Bay operations is estimated at 14.6 million with west side operations capable of 5.2 million and east side operations capable of 9.4 million. The export and fresh/frozen capacity totals 4.4 million salmon. Therefore the estimated combined processing capacity of Bristol Bay is 19.0 million salmon per commercial fishing season.

Short Term Production Limits. The short term processing capacity of all Bristol Bay facilities is estimated at 2.9 million salmon per three day period. This estimate is derived from the 2.4 million short term canning capacity plus a .5 million salmon estimate of export and fresh/frozen capacity.

Harvest Projections and Anticipated Peak Harvest Rate. A total of 9.8 million salmon with a range of 3.8 to 14.8 million are anticipated to be harvested in Bristol Bay in 1978. This estimate consists of 6.3 million sockeye, 110,000 kings, 650,000 chums, 2.6 million pinks and 100,000 coho salmon. If the 1978 salmon run in Bristol Bay exhibits a normal entry pattern and the harvest is normally distributed, a potential maximum peak short term harvest rate of 1.5 million could occur anytime during the first two weeks in July.

Indicated Critical Harvest Limits for Bristol Bay Processing. Based on data presented it appears that the existing processing capabilities anticipated in Bristol Bay for 1978 is potentially capable of handling a 19.0 million salmon harvest if distributed normally through the commercial fishing season. The data also indicates that the short term maximum capacity is roughly 2.9 million salmon. This estimated capacity exceeds the anticipated potential maximum harvest rate of 1.5 million salmon.

Supplemental Processing Options. As previously discussed the largest potential for supplemental capacity exists in the export operations. The majority of air craft export operations are directed through the Anchorage area. The potential for this is difficult to estimate as many of the operators that may use exporting as a means to increase their capacity may not make commitments until the season gets underway.

The tendering capacity of Bristol Bay appears adequate to meet the needs associated with the projected harvest. The availability of additional tender capacity would largely depend on the Kodiak and Alaska Peninsula salmon fisheries. If salmon returns to those areas are in the high end of the projected range, then it would be doubtful that additional tender capacity would be available to Bristol Bay.